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TRANSONIC FAN/COMPRESSOR ROTOR DESIGN STUDY

Volume II

D.E. Parker and M.R. Simonson

General Electric Company
Aircraft Engine Business Group
Advanced Technology Programs Dept.
Cincinnati, Ohio 45215

February 1982

Final Report for Period September 1980 - February 1982

Aero Propulsion Laboratory
Air Force Wright Aeronautical Laboratories
Air Force System Command
Wright-Patterson Air Force Base, Ohio 45433

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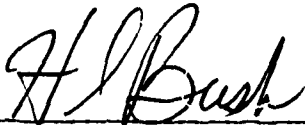This technical report has been reviewed and is approved for publication.

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Chief, Compressor Research Group

WALKER H. MITCHELL
Chief, Technology Branch

FOR THE COMMANDER

H. IVAN BUSH
Director, Turbine Engine Division

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Compressor	Blade Thickness
Rotor	Camber Distribution
Aerodesign	Throat Margin
Aerodynamics	

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Volumes I through VI of this report describes the aerodynamic design of a series of five transonic rotors all parametrically related to a baseline design documented in Technical Report AFAPL-TR-79-2078. Each of the five designs deviate from the base line, in so far as practical, by a variation of one parameter only. The parametric variations are specified at the rotor tip. The original hub characteristics were preserved to the maximum extent practical. The varied parameter was adjusted long the span.

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This volume describes the aerodynamic design details of the Phase I Rotor. The Phase I rotor has the tip airfoil maximum thickness located at 40% of meanline length as compared with 70% for the baseline rotor. The location of maximum thickness varied linearly with radius to 56% of meanline length at the hub, which is the same as the baseline rotor.

<u>VOLUME II</u>

<u>PHASE I ROTOR DESIGN</u>

<u>FOREWORD</u>

This Final Technical Report was prepared by the Advanced Technology Programs Department, Aircraft Engine Business Group, General Electric Company, Evendale , Ohio for the United States Air Force Systems Command, Air Force Wright Aeronautical Laboratories Wright-Patterson Air Force Base, Ohio under Contract F33615-80-C-2059. The work was performed over a period of one year starting in September 1980. Effren Strain (Captain USAF) was the Air Force Project Engineer for this program.

This report describes the results of an effort to aerodynamically define five rotor designs, all parametrically related to a base line design which could be evaluated by future testing in order to define the sensitivity of transonic blade rows to several design variables.

For the General Electric Company Mr. D.E. Parker was the Technical Program Manager for this program. Mr. M.R. Simonson was the principal investigator. Mr. A.J. Bilhardt was the overall Program Manager.

VOLUME II

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LIST OF ILLUSTRATIONS

LIST OF SYMBOLS AND ABBREVIATIONS

1. Used in Circumferential Average Flow Output Tables

STA	calculation station number	
WTF	total airflow	
PSIC	stream function (0 = tip (OD), 1 = hub (ID))	
Z	axial location	inches
R	radius	inches
PHI	streamline slope	degrees
CURV	streamline curvature ⌣ = neg., ⌢ = pos.	1/inches
VM	meridional velocity	ft/sec
CU	absolute tangential velocity	ft/sec
ALPHAM	absolute flow angle on stream surface	degrees
MM	meridional Mach number	
SL	calculation streamline number	
BLDBLK	flow blockage factor (free area - blocked area)/free area	
PS	static pressure	psia
PT	total pressure	psia
TT	total temperature	degrees
BETAM	relative flow angle on stream surface	degrees
UREL	relative velocity	ft/sec
MREL	relative Mach number	
VABS	absolute velocity	ft/sec
MABS	absolute Mach number	
GAMMA	specific heat ratio	
PT-RAT	total pressure/inlet total pressure	
TT-RAT	total temperature/inlet total temperature	
RCU	radius x tangential velocity	in-ft/sec
CZ	axial velocity	ft/sec
PCT IMM	percent annulus immersion from tip (OD)	
RAD	average of leading and trailing edge streamline radii	inches
ACC PT RATIO	cumulative total pressure ratio	
ACC TT RATIO	cumulative total temperature ratio	

LIST OF SYMBOLS AND ABBREVIATIONS

1. Used in Circumferential Average Flow Output Tables (Cont'd)

AD. adiabatic efficiency

POLY polytropic efficiency

Axial
VEL R axial velocity ratio across blade row

2. Used in Stream Surface Blade Coordinate Tables

PT	point number	
PCT X	fraction of meridional distance from leading edge	
X	meridional coordinate on meanline	inches
Y	tangential coordinate on meanline	inches
B*M	meanline angle on stream surface	degrees
T(M)	thickness of blade perpendicular to meanline	inches
XS	meridional coordinate on suction surface	inches
YS	tangential coordinate on suction surface	inches
XP	meridional coordinate on pressure surface	inches
YP	tangential coordinate on pressure surface	inches

3. Used in Plane Section Coordinate Tables

Z	axial coordinate of stacking axis	inches
R	radius of coordinate system origin	inches
MU	tilt angle in axial direction	degrees
ETA	tilt angle in tangential direction	degrees
RHO	section height	inches
PT	point number	
ALPHA	axial coordinate	inches
ZETA*	meanline angle from axial	degrees
UPSILON	coordinate perpendicular to ALPHA and radius	inches
PCT AL	fraction of axial distance from leading edge	
T/C	local thickness/chord ratio	

SECTION VII

DESIGN OF PHASE I ROTOR

1. INTRODUCTION

The specification of the chordwise location of airfoil maximum thickness
of the transonic/compressor rotors has often been defined more on the basis
of historical practice than on a knowledge of its aerodynamic effect. Research
by NASA in the 1950's generally indicated that as relative inlet Mach numbers
rose, it was desirable to move the location of maximum thickness aft on an
airfoil.

The early work, however, was done with airfoils having significant positive
camber. Today, many airfoils have little overall relative turning in the tip
region, and frequently have S-shaped meanlines: negative camber followed by
some positive camber. In some cases, a forward shift in maximum airfoil thick-
ness may help achieve the desired airfoil suction surface shape, with a less
S-shaped meanline. There is also incentive to move the maximum thickness
forward to make the blade more capable of withstanding a bird strike without
excessive damage.

To get more definitive aerodynamic data on the effect of the location of
airfoil maximum thickness, the Phase I blade has been designed with the maximum
thickness located at 40% and the Phase II blade with maximum thickness at
55%, compared with the baseline rotor which has its tip maximum thickness at
70% of meanline length.

2. DESIGN PROCEDURE

The "data match" circumferential average flow solution, which was
previously described in Vol. I, was used as a starting point for the design
of the Phase I rotor. The annulus blockage used in the internal blade
calculation stations was adjusted to be consistent with the forward shift of
the airfoil maximum thickness. The assumed chordwise distribution of work
was iteratively adjusted to obtain a calculated chordwise distribution of
static pressure similar to that of the data match calculations of the baseline
rotor. Also the blade meanline departure angles (the difference between the
air angle and the meanline angle) were adjusted to maintain the same throat

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area and flow induction capacity as the baseline blade. To adjust for the increased blade blockage in the forward half of the blade, and to better match the data match static pressure distribution in the hub, the hub contour internally within the rotor was modified slightly relative to the baseline rotor. The two hub contours are compared in Figure 19.

After each modification to the chordwise work distribution and/or departure angles, revised blade annulus blockage and blade lean angles were calculated and input to the circumferential Average Flow Determination (CAFD) computer program for the next iteration.

The rotor exit radial distribution of total pressure and temperature was maintained the same as the data match of the baseline rotor.

The resulting streamline static pressure distribution for the Phase I blade is compared with the data match of the baseline rotor on Figure 20.

The assumed streamline work input (as a fraction of the total streamline work) is plotted versus percent axial projection in Figure 21. The tip streamline is the one on the left. Each subsequent streamline is indexed to the right by the value of its stream function (fraction of the total flow from the tip). The dashed lines are lines of constant percent axial projection.

A method of characteristics computer program was used to analyze the flow in the cascade flow induction region for streamlines 3 and 6 to assure that the rotor would achieve the design flow. For other streamlines, the difference between the suction surface angle and the "free flow" streamline angle was compared with similar data from the data match calculations of the baseline rotor. This then, was used as a guide in setting the suction surface angle in the flow induction region.

To satisfy the same flow induction capacity as the baseline blade, it was required to use larger meanline incidence angles as a result of the larger blade leading edge wedge angle resulting from the forward location of maximum thickness. Phase I blade incidence angles are shown on Figure 22.

A modified version of Carter's Rule was used to calculate a reference deviation angle for the baseline rotor. This procedure converts the vector diagrams (from the data match calculations) to an equivalent two-dimensional

2
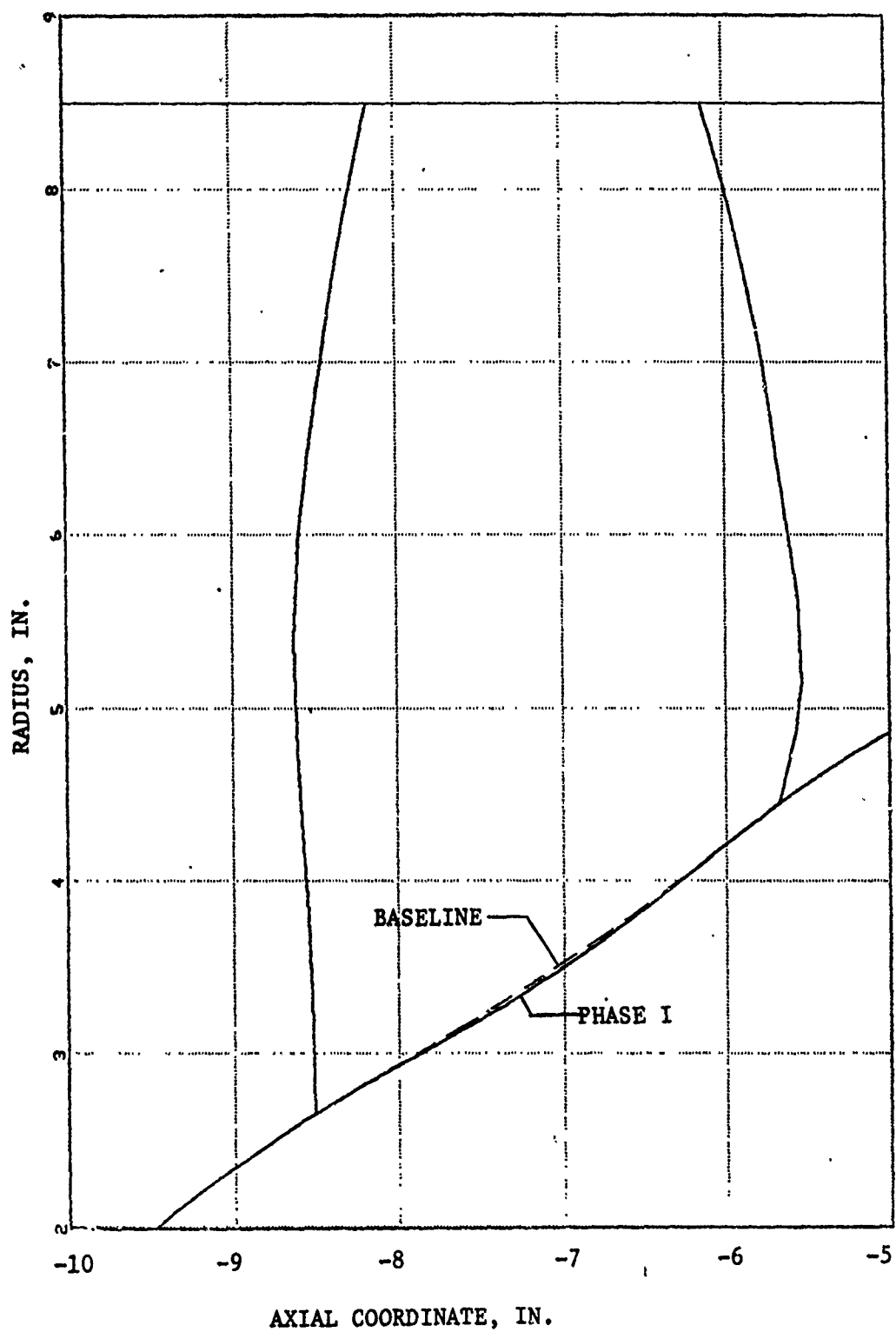
Figure 19. Comparison of Phase I Rotor Hub Contour to Baseline Rotor Hub Contour

set of vectors which would produce the same circulation as the actual blade
taking into account the change in streamline radius and meridional velocity.
The difference between the deviation angle implied by the data match calculations
and the reference deviation angle was then added to the reference deviation
angle calculated from the modified Carter's Rule for the Phase I blade.
Phase I Rotor deviation angles are shown on Figure 23. A plot of departure
angles for each streamsurface section is shown in Figure 24. Once the intra-
blade work distribution was chosen these departure angles were required to
satisfy the desired incidence angles, deviation angles, and passage area ratios.
The resulting streamsurface tip section of the Phase I rotor is compared to
that of the baseline rotor in Figure 25. The "deviation angle minus reference
deviation angle" for the Phase I rotor was kept essentially the same as the data
match analysis although there are some small differences. Figure 26 shows the
"delta deviation" compared to the data match of the baseline design.

If the performance of a new rotor design is to be accurately evaluated
by comparing overall stage performance with the baseline design then it is
important that the stator have nearly the same entering conditions in both
cases. Figure 27 shows a comparison of the Phase I stator incidence angles
with the data match base. As can be seen the differences are small.

Figure 28 shows the radial distribution of Phase I rotor throat margin
and compares it to the data match case. The throat margin for a streamsurface
blade section is defined here as the percent of excess throat area over and
above the minimum theoretical area required to pass the streamtube flow at a
throat Mach number of 1.0 and assuming a total pressure loss equivalent to a
normal shock at the upstream Mach number. In a rotor the effect of radius change
(between the leading edge and throat) on the relative total enthalpy and pressure
is included. As can be seen in Figure 27 the Phase I rotor throat margin is
nearly identical to that of the data match of the baseline design.

Details of the Phase I rotor design are given in Section VIII.

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Figure 20. Phase I Rotor Static Pressure Distribution

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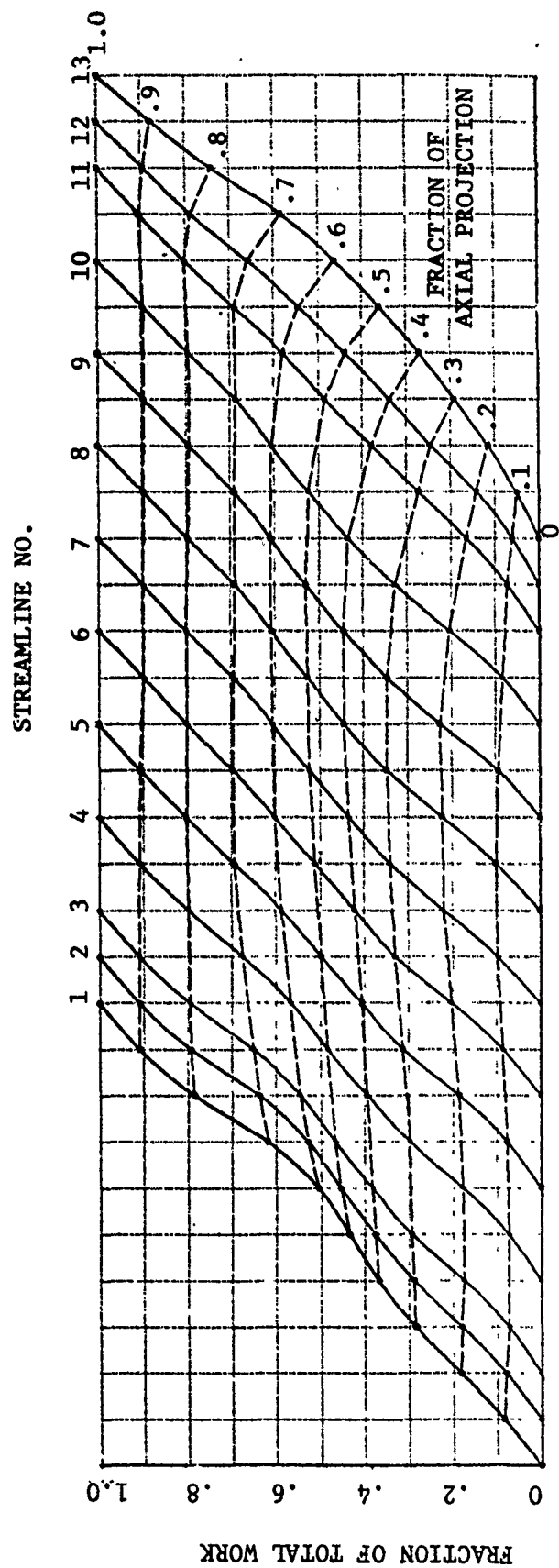
Figure 21. Phase I Rotor Intrablade Work Distribution

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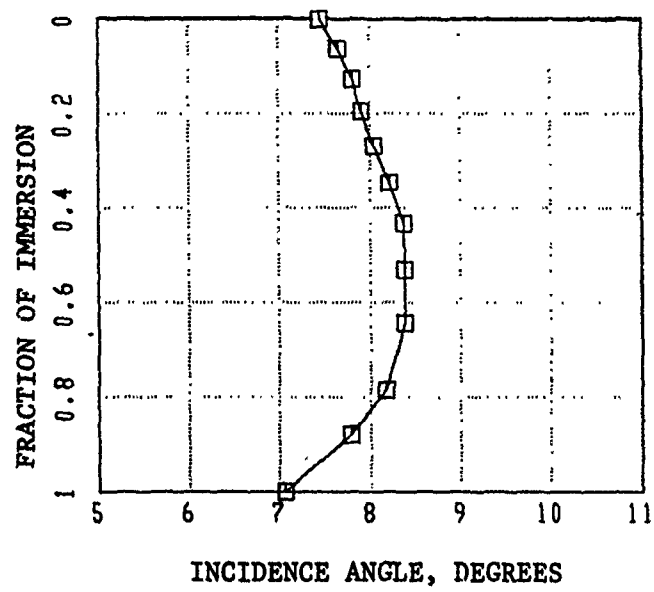
Figure 22. Phase I Rotor Incidence Angle
Versus Fractional Immersion
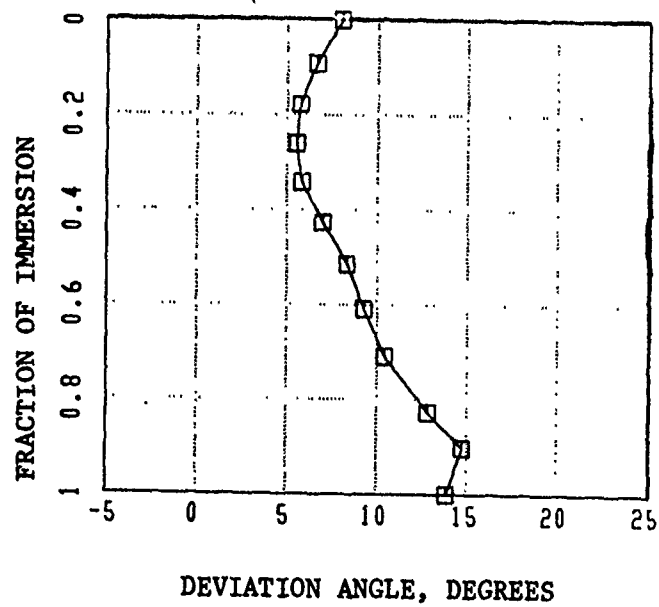
Figure 23. Phase I Rotor Deviation Angle
Versus Fractional Immersion

DEPARTURE ANGLE, 1 DIVISION = 4 DEGREES
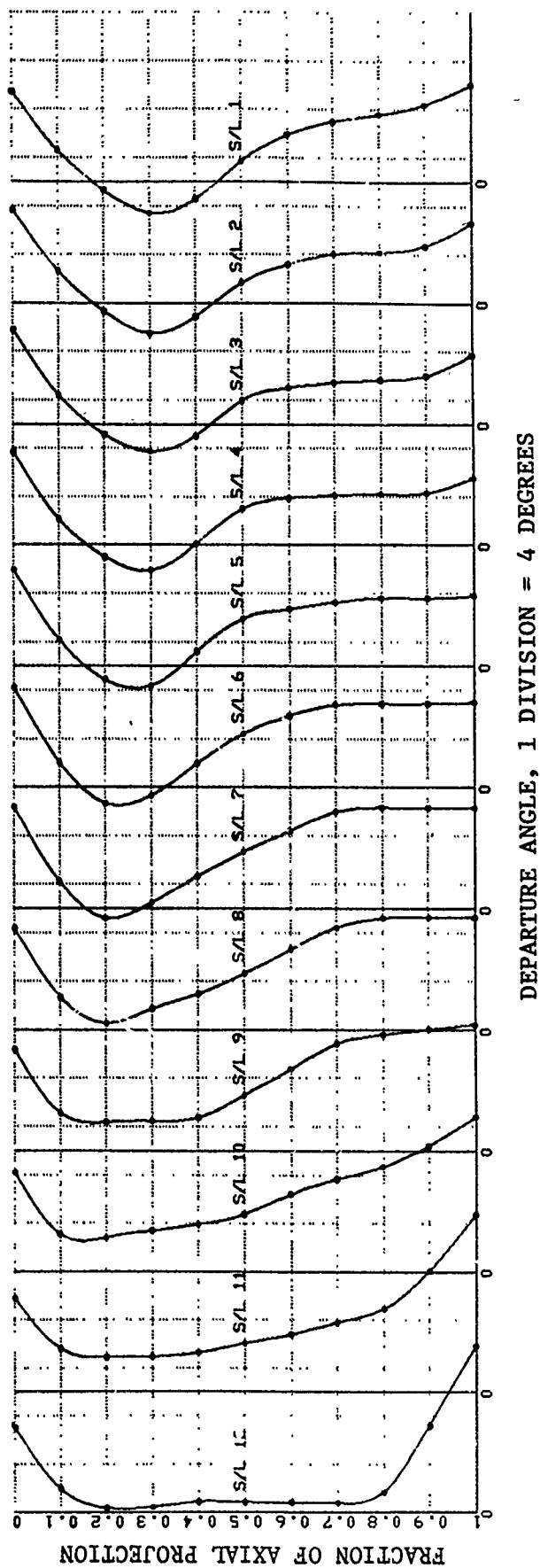
Figure 24   Phase I Rotor Intrablade Departure Angle Distribution

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LEADING EDGE

PHASE I

BASELINE

ROTATION
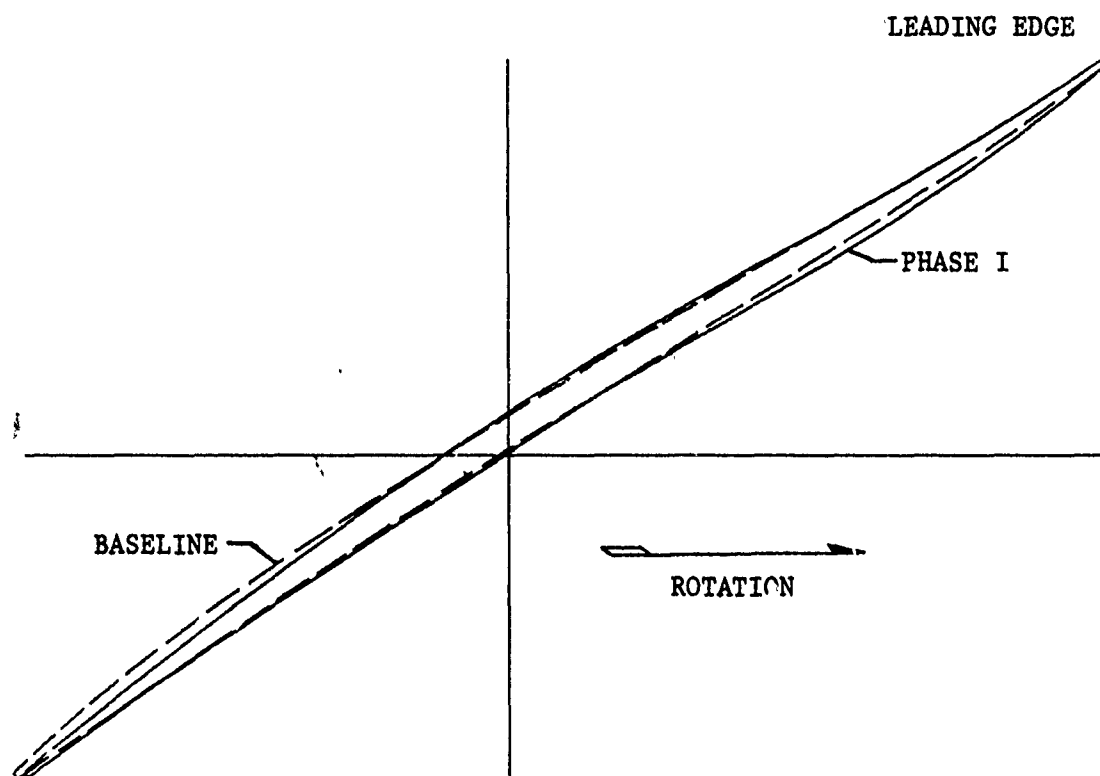
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Compared With Baseline Design
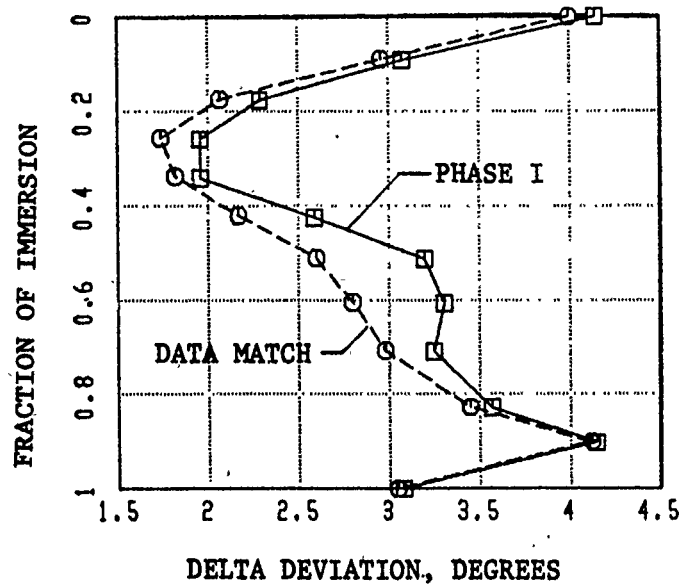
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Reference Deviation Angle Compared
With Data Match
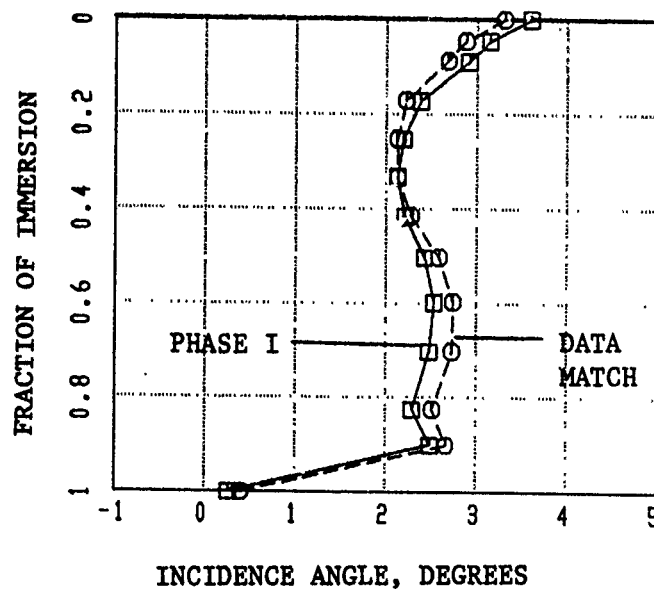
Figure 27   Phase I Stator Incidence Angle
Compared With Data Match
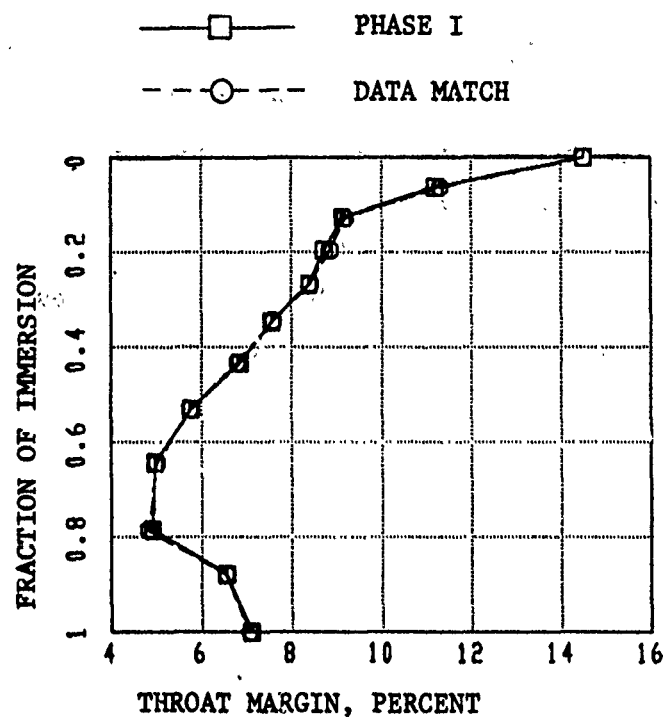
Figure 28. Phase I Rotor Throat Margin
Compared With Data Match

SECTION VIII
DETAILS OF PHASE I ROTOR DESIGN

1. CIRCUMFERENTIAL AVERAGE FLOW SOLUTION

The following tabulation presents the detail results of the Phase I Rotor circumferential average flow computation. Each page of the tabulation gives results for one calculation station. Figure 29 shows the calculation station locations within the gas flowpath. At each calculation station various aerodynamic parameters are given on each of thirteen calculation streamlines. Also given are several mass averaged station flow properties. The Phase I rotor blade forces are included at the end of this tabulation.
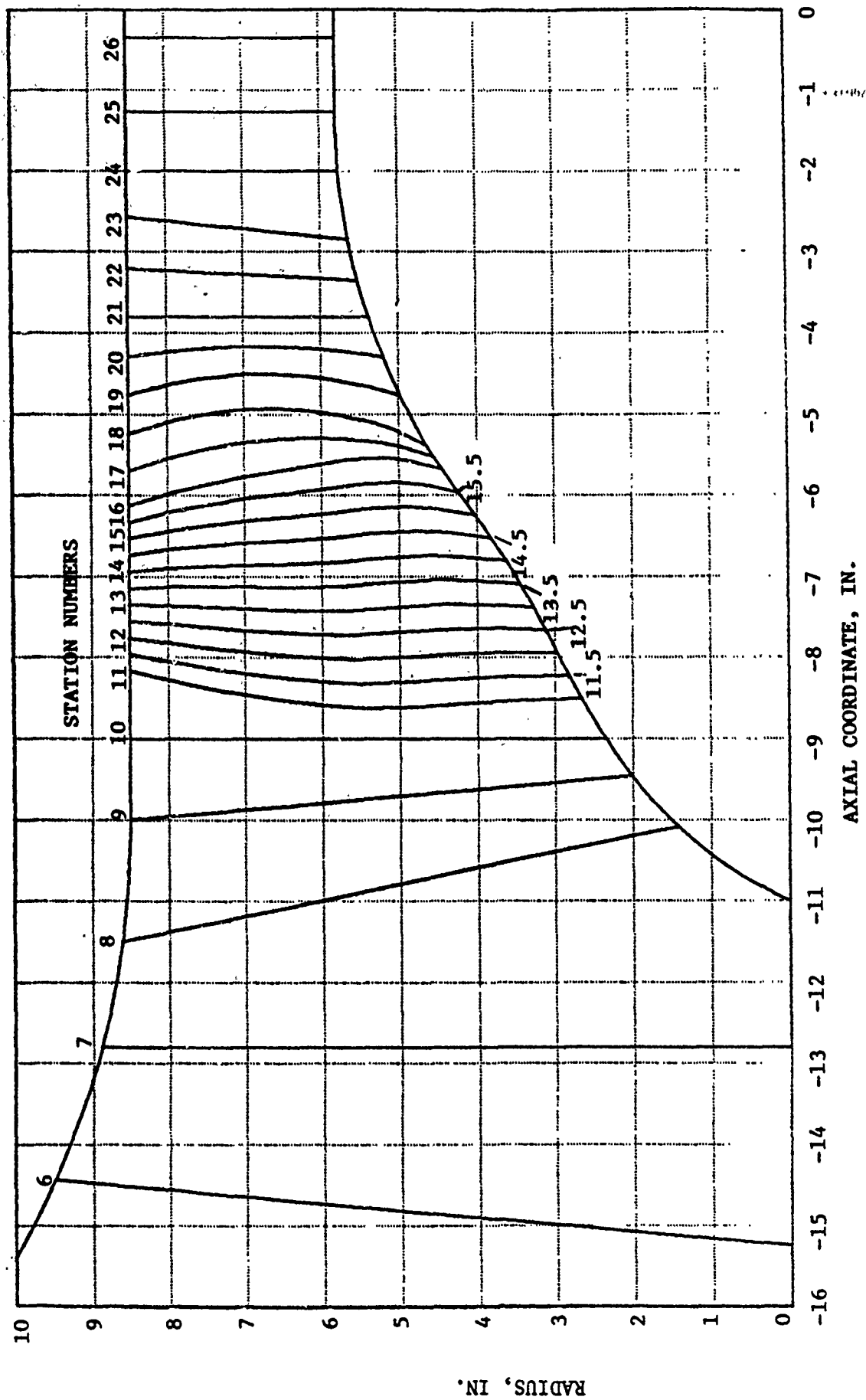
Figure 29. Compressor Flowpath With Calculation Stations

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INLET   I= 1   STA= 5.000   D*C=0.   FREE

WTF= 61.365   OPTX=DPP   M*IP= 1   AFLOW= 478.13   D*H=0.
   OPTY=FREE   ITYPE=0   INER=0   ABC=0.   ABH=0.

PSiC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-18.800	13.207	-50.10	0.0831	150.4	0.	0.	0.135
0.050	-18.800	12.564	-43.54	0.	181.0	0.	0.	0.163
0.100	-18.800	12.020	-40.31	0.	195.9	0.	0.	0.176
0.200	-18.800	11.027	-34.70	0.	218.6	0.	0.	0.196
0.300	-18.800	10.099	-29.90	0.	237.1	0.	0.	0.213
0.400	-18.800	9.193	-25.65	0.	252.4	0.	0.	0.22?
0.500	-18.800	8.277	-21.78	0.	265.2	0.	0.	0.2?
0.600	-18.800	7.319	-18.16	0.	275.9	0.	0.	0.24?
0.700	-18.800	6.277	-14.68	0.	284.9	0.	0.	0.25?
0.800	-18.800	5.083	-11.18	0.	292.5	0.	0.	0.264
0.900	-18.800	3.569	-7.34	0.	298.9	0.	0.	0.270
0.950	-18.800	2.516	-4.91	0.	301.6	0.	0.	0.272
1.000	-18.800	0.000	0.	0.	303.9	0.	0.	0.274

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.997	14.510	14.696	518.7	86.31	2335.4	2.095	150.4	0.135
2	0.997	14.427	14.696	518.7	85.33	2224.5	1.997	181.0	0.163
3	0.997	14.382	14.696	518.7	84.72	2130.2	1.913	195.9	0.176
4	0.997	14.305	14.696	518.7	83.59	1958.1	1.760	218.6	0.196
5	0.997	14.237	14.696	518.7	82.42	1797.9	1.617	237.1	0.213
6	0.997	14.177	14.696	518.7	81.16	1641.9	1.477	252.4	0.227
7	0.997	14.124	14.696	518.7	79.71	1484.6	1.337	265.2	0.239
8	0.997	14.077	14.696	518.7	77.94	1320.6	1.190	275.9	0.248
9	0.997	14.037	14.696	518.7	75.57	1143.7	1.031	284.9	0.257
10	0.997	14.002	14.696	518.7	71.94	943.5	0.850	292.5	0.264
11	0.997	13.972	14.696	518.7	64.61	697.2	0.629	298.9	0.270
12	0.997	13.959	14.696	518.7	55.81	536.8	0.484	301.6	0.272
13	0.997	13.947	14.696	518.7	0.00	303.9	0.274	303.9	0.274

STA   5.000   MASS AVERAGED PROPERTIES

PT= 14.696   TT= 518.69   GAMMA=1.4015   PT-RAT= 1.000   TT-RAT= 1.000
RCU= 0.   VM= 255.3   CZ= 233.4   MM=0.230   MABS=0.230   MREL=1.300

INLET

WTF= 61.365   I= 2   OPTX=DPP   STA= 6.000   MTIP= 14   AFLOW= 277.56   D*C=0. ABC=0.   D*H=0. ABH=0.   FREE

OPTY=FREE ITYPE=0 INBR=0

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-14.431	9.481	-24.96	-0.0952	514.6	0.	0.	0.471
0.050	-14.450	9.254	-24.10	-0.1028	507.6	0.	0.	0.464
0.100	-14.470	9.020	-22.95	-0.0955	501.1	0.	0.	0.458
0.200	-14.513	8.532	-20.65	-0.0825	489.4	0.	0.	0.447
0.300	-14.558	8.010	-18.38	-0.0712	478.4	0.	0.	0.436
0.400	-14.606	7.446	-16.13	-0.0614	467.7	0.	0.	0.426
0.500	-14.650	6.829	-13.87	-0.0529	457.2	0.	0.	0.416
0.600	-14.719	6.141	-11.59	-0.0455	446.4	0.	0.	0.406
0.700	-14.787	5.352	-9.23	-0.0390	434.9	0.	0.	0.395
0.800	-14.869	4.402	-6.73	-0.0330	422.1	0.	0.	0.383
0.900	-14.978	3.142	-4.03	-0.0257	407.0	0.	0.	0.369
0.950	-15.057	2.235	-2.57	-0.0189	398.2	0.	0.	0.361
1.000	-15.250	0.000	0.	0.	387.6	0.	0.	0.351

SL	BLDBLK	PS	R	PT	TT	BETAM	VM	VREL	MREL	VABS	MABS
1	0.997	12.623	9.481	14.696	518.7	72.90	514.6	1750.4	1.601	514.6	0.471
2	0.997	12.677	9.254	14.696	518.7	72.73	507.6	1710.1	1.564	507.6	0.464
3	0.997	12.726	9.020	14.696	518.7	72.53	501.1	1668.8	1.525	501.1	0.458
4	0.997	12.812	8.532	14.696	518.7	72.00	489.4	1583.2	1.445	489.4	0.447
5	0.997	12.892	8.010	14.696	518.7	71.30	478.4	1492.2	1.361	478.4	0.436
6	0.997	12.968	7.446	14.696	518.7	70.41	467.7	1394.8	1.271	467.7	0.426
7	0.997	13.042	6.829	14.696	518.7	69.22	457.2	1288.9	1.174	457.2	0.416
8	0.997	13.116	6.141	14.696	518.7	67.61	446.4	1172.0	1.066	446.4	0.406
9	0.997	13.193	5.352	14.696	518.7	65.27	434.9	1039.7	0.945	434.9	0.395
10	0.997	13.277	4.402	14.696	518.7	61.48	422.1	884.2	0.803	422.1	0.383
11	0.997	13.374	3.142	14.696	518.7	53.72	407.0	687.8	0.624	407.0	0.369
12	0.997	13.428	2.235	14.696	518.7	44.72	398.2	560.4	0.508	398.2	0.361
13	0.997	13.493	0.000	14.696	518.7	0.00	387.6	387.6	0.351	387.6	0.351

STA   6.000   MASS AVERAGED PROPERTIES

PT= 14.696   TT= 518.69   GAMMA=1.4016   PT-RAT= 1.000   TT-RAT= 1.000
RCU= 0.   VM= 455.6   CZ= 438.5   MM=0.415   MABS=0.415   MREL=1.120

INLET   STA= 7.000   FREE

WTF= 61.365   I= 3   MTIP= 27   AFLOW= 244.35   D+C=0.   D+H=0.

     OPTX=DPP   OPTY=FREE   ITYPE=0   INBR=0   ABC=0.   ABH=0.

PSIC	Z	R	PHI	CURV	VM	ALPHAM	CU	MM
0.	-12.800	8.880	-15.47	-0.0952	625.2	0.	0.	0.578
0.050	-12.800	8.675	-14.65	-0.0872	617.8	0.	0.	0.571
0.100	-12.800	8.464	-13.90	-0.0849	610.4	0.	0.	0.564
0.200	-12.800	8.021	-12.40	-0.0794	595.1	0.	0.	0.549
0.300	-12.800	7.546	-10.87	-0.0736	579.6	0.	0.	0.533
0.400	-12.800	7.032	-9.28	-0.0679	563.9	0.	0.	0.518
0.500	-12.800	6.468	-7.60	-0.0628	547.6	0.	0.	0.502
0.600	-12.800	5.837	-5.80	-0.0587	530.4	0.	0.	0.486
0.700	-12.800	5.112	-3.79	-0.0560	511.3	0.	0.	0.468
0.800	-12.800	4.237	-1.46	-0.0558	488.4	0.	0.	0.446
0.900	-12.800	3.064	1.52	-0.0634	455.9	0.	0.	0.415
0.950	-12.800	2.206	3.54	-0.0760	428.7	0.	0.	0.390
1.000	-12.800	0.000	0.	0.	383.6	0.	0.	0.347

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.998	11.715	14.696	518.7	68.25	1687.2	1.560	625.2	0.578
2	0.998	11.779	14.696	518.7	68.02	1650.8	1.525	617.8	0.571
3	0.998	11.844	14.696	518.7	67.77	1613.5	1.490	610.4	0.564
4	0.998	11.974	14.696	518.7	67.20	1535.5	1.415	595.1	0.549
5	0.998	12.105	14.696	518.7	66.48	1452.3	1.337	579.6	0.533
6	0.998	12.235	14.696	518.7	65.56	1363.0	1.253	563.9	0.518
7	0.998	12.366	14.696	518.7	64.37	1266.0	1.162	547.6	0.502
8	0.998	12.502	14.696	518.7	62.75	1158.6	1.061	530.4	0.486
9	0.998	12.649	14.696	518.7	60.45	1036.9	0.948	511.3	0.468
10	0.998	12.819	14.696	518.7	56.84	893.1	0.815	488.4	0.446
11	0.998	13.051	14.696	518.7	49.86	707.2	0.644	455.9	0.415
12	0.998	13.234	14.696	518.7	42.25	579.1	0.526	428.7	0.390
13	0.998	13.517	14.696	518.7	0.00	383.6	0.347	383.6	0.347

STA   7.000   MASS AVERAGED PROPERTIES

PT= 14.696   TT= 518.69   GAMMA=1.4017   PT-RAT= 1.000   TT-RAT= 1.000

RCU= 0.   VM= 539.1   CZ= 532.1   MM=0.495   MABS=0.495   MREL=1.109

INLET   STA= 8.000   AFLOW= 224.06   D*C=0.   FREE

WTF= 61.365   I= 4   MTIP= 40   OPTY=FREE   ITYPE=0   INBR=0   ABC=0.   D*H=0.   ABH=0.

OPTX=DPP

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-11.499	8.608	-8.21	-0.0953	711.9	0.	0.	0.665
0.050	-11.461	8.412	-7.49	-0.0964	703.1	0.	0.	0.656
0.100	-11.421	8.211	-6.86	-0.0909	693.7	0.	0.	0.646
0.200	-11.339	7.790	-5.59	-0.0815	675.6	0.	0.	0.628
0.300	-11.250	7.341	-4.25	-0.0743	658.6	0.	0.	0.611
0.400	-11.155	6.858	-2.78	-0.0694	642.1	0.	0.	0.595
0.500	-11.052	6.333	-1.10	-0.0667	625.0	0.	0.	0.578
0.600	-10.938	5.753	0.89	-0.0666	606.3	0.	0.	0.560
0.700	-10.809	5.096	3.37	-0.0695	583.9	0.	0.	0.538
0.800	-10.656	4.320	6.69	-0.0768	554.6	0.	0.	0.509
0.900	-10.459	3.318	12.10	-0.0935	510.6	0.	0.	0.467
0.950	-10.323	2.629	17.76	-0.1212	468	0.	0.	0.427
1.000	-10.086	1.421	47.99	0.1910	434.0	0.	0.	0.395

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.997	10.920	14.696	518.7	64.89	1677.5	1.567	711.9	0.665
2	0.997	11.004	14.696	518.7	64.66	1642.5	1.533	703.1	0.656
3	0.997	11.092	14.696	518.7	64.42	1606.4	1.497	693.7	0.646
4	0.997	11.260	14.696	518.7	63.83	1531.7	1.424	675.6	0.628
5	0.997	11.416	14.696	518.7	63.05	1453.3	1.349	658.6	0.611
6	0.997	11.565	14.696	518.7	62.05	1370.0	1.269	642.1	0.595
7	0.997	11.716	14.696	518.7	60.78	1280.5	1.184	625.0	0.578
8	0.997	11.879	14.696	518.7	59.15	1182.5	1.091	606.3	0.560
9	0.997	12.069	14.696	518.7	57.00	1072.2	0.987	583.9	0.538
10	0.997	12.310	14.696	518.7	53.96	942.7	0.866	554.6	0.509
11	0.997	12.654	14.696	518.7	48.91	776.9	0.710	510.6	0.467
12	0.997	12.965	14.696	518.7	44.75	659.1	0.601	468.1	0.427
13	0.997	13.199	14.696	518.7	30.02	501.2	0.456	434.0	0.395

STA 8.000 MASS AVERAGED PROPERTIES

PT= 14.696   TT= 518.69   GAMMA=1.4017   PT-RAT= 1.000   TT-RAT= 1.000

RCU= 0.   VM= 612.1   CZ= 604.7   MM=0.566   MABS=0.566   MREL=1.140

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INLET   STA= 9.000   AFLOW= 211.86   D+C=0.   FREE

WTF= 61.365   I= 5   WTIP= 53   ITYPE=0 INBR=0   ABC=0.   D+H=0.

OPTX=DPP   OPTY=FREE   ABI=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-9.999	8.500	0.	0.	758.2	0.	0.	0.712
0.050	-9.984	8.315	-1.11	-0.0541	751.2	0.	0.	0.705
0.100	-9.968	8.125	-0.89	-0.0523	743.3	0.	0.	0.697
0.200	-9.935	7.727	-0.29	-0.0504	729.6	0.	0.	0.683
0.300	-9.900	7.304	0.58	-0.0506	715.6	0.	0.	0.669
0.400	-9.862	6.851	1.73	-0.0526	700.5	0.	0.	0.653
0.500	-9.821	6.358	3.25	-0.0568	682.9	0.	0.	0.636
0.600	-9.776	5.816	5.20	-0.0630	661.3	0.	0.	0.614
0.700	-9.725	5.201	7.75	-0.0714	633.5	0.	0.	0.586
0.800	-9.665	4.475	11.18	-0.0795	596.6	0.	0.	0.550
0.900	-9.587	3.542	16.60	-0.0812	546.2	0.	0.	0.501
0.950	-9.536	2.919	21.63	-0.0406	515.4	0.	0.	0.472
1.000	-9.460	2.011	38.65	0.1881	511.5	0.	0.	0.468

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.996	10.473	14.696	518.7	63.19	1680.7	1.579	758.2	0.712
2	0.996	10.541	14.696	518.7	62.89	1648.5	1.548	751.2	0.705
3	0.996	10.619	14.696	518.7	62.60	1615.0	1.515	743.3	0.697
4	0.996	10.751	14.696	518.7	61.85	1546.5	1.448	729.6	0.683
5	0.996	10.885	14.696	518.7	60.96	1474.3	1.378	715.6	0.669
6	0.996	11.029	14.696	518.7	59.91	1397.2	1.303	700.5	0.653
7	0.996	11.193	14.696	518.7	58.68	1313.5	1.223	682.9	0.636
8	0.996	11.392	14.696	518.7	57.20	1220.9	1.133	661.3	0.614
9	0.996	11.642	14.696	518.7	55.39	1115.2	1.032	633.5	0.586
10	0.996	11.961	14.696	518.7	52.93	989.7	0.912	596.6	0.550
11	0.996	12.377	14.696	518.7	48.85	830.1	0.762	546.2	0.501
12	0.996	12.617	14.696	518.7	44.99	728.7	0.667	515.4	0.472
13	0.996	12.647	14.696	518.7	34.75	622.5	0.569	511.5	0.468

STA   9.000   MASS AVERAGED PROPERTIES

PT= 14.696   TT= 518.69   GAMMA=1.4018   PT-RAT= 1.000   TT-RAT= 1.000

RCU= 0.   VM= 663.8   CZ= 655.3   MM=0.617   MABS=0.617   MREL=1.178

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INLET   STA= 10.000
WTF= 61.365   I= 6   MTIP= 66   AFLOW= 204.14   D=C=0.   ABC=0.   D+H=0.   ABH=0.
                 OPTX=DPP   OPTY=FREE   ITYPE=0   INBR=0   FREE

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	NM
0.	-9.000	8.500	0.	0.	772.2	0.	0.	0.727
0.050	-9.000	8.317	0.32	0.0031	772.5	0.	0.	0.727
0.100	-9.000	8.130	0.61	-0.0019	772.5	0.	0.	0.727
0.200	-9.000	7.742	1.37	-0.0114	770.1	0.	0.	0.725
0.300	-9.000	7.332	2.38	-0.0195	764.4	0.	0.	0.719
0.400	-9.000	6.895	3.74	-0.0287	754.7	0.	0.	0.709
0.500	-9.000	6.423	5.51	-0.0391	739.7	0.	0.	0.693
0.600	-9.000	5.905	7.85	-0.0551	716.8	0.	0.	0.670
0.700	-9.000	5.319	10.79	-0.0731	682.7	0.	0.	0.635
0.800	-9.000	4.626	14.48	-0.0891	635.0	0.	0.	0.588
0.900	-9.000	3.733	19.56	-0.0861	574.8	0.	0.	0.529
0.950	-9.000	3.141	23.67	-0.0821	535.8	0.	0.	0.491
1.000	-9.000	2.340	32.46	0.1922	544.1	0.	0.	0.499

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.994	10.334	14.696	518.7	62.76	1687.1	1.588	772.2	0.727
2	0.994	10.332	14.696	518.7	62.24	1658.6	1.562	772.5	0.727
3	0.994	10.331	14.696	518.7	61.70	1629.4	1.534	772.5	0.727
4	0.994	10.355	14.696	518.7	60.59	1568.3	1.476	770.1	0.725
5	0.994	10.411	14.696	518.7	59.42	1502.8	1.413	764.4	0.719
6	0.994	10.507	14.696	518.7	58.19	1431.8	1.345	754.7	0.709
7	0.994	10.653	14.696	518.7	56.87	1353.5	1.269	739.7	0.693
8	0.994	10.874	14.696	518.7	55.48	1264.8	1.182	716.8	0.670
9	0.994	11.195	14.696	518.7	53.97	1160.7	1.080	682.7	0.635
10	0.994	11.628	14.696	518.7	52.12	1034.2	0.957	635.0	0.588
11	0.994	12.145	14.696	518.7	48.90	874.3	0.804	574.8	0.529
12	0.994	12.460	14.696	518.7	45.97	770.9	0.707	535.8	0.491
13	0.994	12.394	14.696	518.7	37.19	683.0	0.627	544.1	0.499

STA 10.000 MASS AVERAGED PROPERTIES
PT= 14.696   TT= 518.69   GAMMA=1.4018   PT-RAT= 1.000   TT-RAT= 1.000
RCU= 0.   VM= 705.7   CZ= 694.3   MM=0.660   MABS=0.660   MREL=1.216

ROTOR1

WTF= 61.365   I= 7   OPTX=DPP   STA= 11.000   MTIP= 79   AFLOW= 197.55   OPTV=FREE ITYPE=4 INBR=3   LE ROTOR   D*C=0. D*H=0. ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-8.166	8.500	0.	0.	825.2	0.	0.	0.783
0.050	-8.204	8.321	0.30	-0.0019	826.4	0.	0.	0.784
0.100	-8.243	8.139	0.60	0.0024	827.3	0.	0.	0.785
0.200	-8.322	7.760	1.44	0.0078	828.8	0.	0.	0.787
0.300	-8.397	7.360	2.70	0.0008	826.5	0.	0.	0.784
0.400	-8.466	6.933	4.35	-0.0108	817.0	0.	0.	0.774
0.500	-8.531	6.473	6.43	-0.0292	797.8	0.	0.	0.754
0.600	-8.592	5.966	9.02	-0.0440	766.2	0.	0.	0.721
0.700	-8.624	5.396	12.22	-0.0564	723.3	0.	0.	0.677
0.800	-8.604	4.735	16.31	-0.0663	671.1	0.	0.	0.624
0.900	-8.548	3.904	21.72	-0.0699	601.7	0.	0.	0.555
0.950	-8.526	3.360	25.69	-0.0528	557.9	0.	0.	0.512
1.000	-8.507	2.653	31.03	0.1665	556.1	0.	0.	0.511

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.990	9.801	14.696	518.7	61.18	1712.0	1.624	825.2	0.783
2	0.990	9.789	14.696	518.7	60.63	1685.0	1.599	826.4	0.784
3	0.990	9.780	14.696	518.7	60.06	1657.4	1.573	827.3	0.785
4	0.990	9.764	14.696	518.7	58.82	1600.7	1.519	828.8	0.787
5	0.990	9.787	14.696	518.7	57.53	1539.5	1.461	826.5	0.784
6	0.990	9.284	14.696	518.7	56.27	1471.2	1.394	817.0	0.774
7	0.990	10.078	14.696	518.7	55.07	1393.3	1.316	797.8	0.754
8	0.990	10.393	14.696	518.7	53.95	1302.1	1.225	766.2	0.721
9	0.990	10.811	14.696	518.7	52.78	1195.9	1.119	723.3	0.677
10	0.990	11.302	14.696	518.7	51.23	1071.8	0.996	671.1	0.624
11	0.990	11.918	14.696	518.7	48.87	914.7	0.844	601.7	0.555
12	0.990	12.283	14.696	518.7	46.75	814.2	0.748	557.9	0.512
13	0.990	12.298	14.696	518.7	40.10	726.9	0.668	556.1	0.511

STA   11.000   MASS AVERAGED PROPERTIES

PT= 14.696 TT= 518.69 GAMMA=1.4018 PT-RAT= 1.000 TT-RAT= 1.000
RCU= 0.   VM= 754.0   CZ= 739.9   MM=0.710   MABS=0.710   MREL=1.259

ROTOR1   I = 8   STA= 11.500   IN ROTOR

WTF= 61.365   OPTX=TT   MTIP= 92   AFLOW= 178.74   D*C=0.   D*H=0.

                     OPTY=PT   ITYPE=5 INBR=3   ABC=0.   ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-7.963	8.500	0.	0.	855.5	49.2	3.29	0.805
0.050	-7.991	8.322	0.13	0.0290	860.3	46.6	3.10	0.811
0.100	-8.020	8.141	0.38	0.0311	865.5	42.6	2.82	0.817
0.200	-8.083	7.765	1.21	0.0254	885.2	43.3	2.80	0.839
0.300	-8.143	7.372	2.59	0.0150	899.6	46.1	2.93	0.854
0.400	-8.198	6.954	4.44	-0.0010	905.3	52.8	3.34	0.860
0.500	-8.251	6.505	6.71	-0.0058	897.6	62.2	3.96	0.850
0.600	-8.301	6.014	9.29	0.0114	871.5	66.7	4.39	0.822
0.700	-8.324	5.463	12.53	0.0205	835.9	68.4	4.68	0.785
0.800	-8.299	4.827	16.79	0.0128	786.1	66.9	4.87	0.734
0.900	-8.247	4.027	22.09	0.0299	714.8	68.4	5.47	0.663
0.950	-8.231	3.504	25.56	0.0662	674.4	66.0	5.59	0.623
1.000	-8.224	2.815	28.62	0.0917	656.4	68.9	5.99	0.606

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.944	10.130	15.543	531.0	59.47	1684.3	1.584	856.9	0.806
2	0.944	10.059	15.522	530.1	58.83	1662.1	1.566	861.6	0.812
3	0.943	9.959	15.468	528.9	58.16	1640.8	1.549	866.6	0.818
4	0.940	9.768	15.509	528.6	56.29	1595.2	1.511	886.3	0.840
5	0.935	9.649	15.570	528.7	54.36	1543.9	1.466	900.8	0.855
6	0.927	9.662	15.688	529.5	52.37	1482.8	1.408	906.9	0.861
7	0.917	9.840	15.830	530.6	50.42	1408.8	1.335	899.7	0.852
8	0.907	10.134	15.846	530.5	48.77	1322.4	1.248	874.1	0.825
9	0.898	10.475	15.784	529.7	46.98	1225.1	1.151	838.7	0.788
10	0.886	10.899	15.643	528.2	44.96	1110.8	1.038	788.9	0.737
11	0.865	11.512	15.500	526.8	41.94	961.0	0.891	718.1	0.666
12	0.847	11.795	15.364	525.5	39.31	871.7	0.805	677.7	0.626
13	0.812	11.865	15.248	524.4	33.10	783.5	0.723	660.0	0.609

          STA   11.500 MASS AVERAGED PROPERTIES

PT= 15.623 TT= 528.92 GAMMA=1.4018 PT-RAT= 1.063 TT-RAT= 1.020

RCU= 347.5 VM= 841.2 CZ= 824.5 MM=0.792 MABS=0.794 MREL=1.275

ROTOR1 I= 9 STA= 12.000 AFLOW= 166.91 IN ROTOR

WTF= 61.365 OPTX=TT MTIP=105 OPTY=PT ITYPE=5 INBR=3 D•C=0. D•H=0. ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-7.759	8.500	0.	0.	830.2	106.3	7.30	0.767
0.050	-7.778	8.322	-0.19	0.0239	836.3	105.3	7.18	0.774
0.100	-7.798	8.141	-0.03	0.0342	842.5	102.3	6.92	0.781
0.200	-7.844	7.770	0.84	0.0280	866.8	104.5	6.88	0.807
0.300	-7.889	7.383	2.32	0.0222	892.3	111.4	7.12	0.834
0.400	-7.931	6.975	4.38	0.0090	915.3	124.2	7.73	0.858
0.500	-7.971	6.538	6.66	0.0121	927.6	138.8	8.51	0.870
0.600	-8.010	6.061	9.19	0.0007	917.4	148.0	9.17	0.860
0.700	-8.024	5.529	12.33	0.0026	891.4	161.6	10.28	0.832
0.800	-7.995	4.918	16.40	0.0309	845.8	161.0	10.78	0.787
0.900	-7.946	4.148	21.58	0.0252	777.7	152.4	11.09	0.720
0.950	-7.936	3.642	24.84	0.0116	731.9	149.3	11.53	0.675
1.000	-7.940	2.965	27.61	0.0178	686.8	150.2	12.33	0.632

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.913	11.147	16.562	545.3	59.22	1622.2	1.499	837.0	0.773
2	0.912	11.103	16.605	544.5	58.47	1599.4	1.480	842.9	0.780
3	0.911	11.018	16.592	543.2	57.73	1578.2	1.464	848.7	0.787
4	0.907	10.810	16.707	542.6	55.61	1534.8	1.430	873.1	0.813
5	0.899	10.614	16.869	542.9	53.17	1488.5	1.392	899.2	0.841
6	0.886	10.487	17.111	544.2	50.40	1436.1	1.346	923.7	0.866
7	0.869	10.458	17.323	545.4	47.58	1375.1	1.290	937.9	0.880
8	0.853	10.579	17.354	545.1	45.13	1300.3	1.219	929.2	0.871
9	0.840	10.882	17.391	545.0	42.41	1207.2	1.127	905.9	0.846
10	0.824	11.197	17.095	542.0	39.89	1102.4	1.026	861.0	0.801
11	0.795	11.592	16.588	537.3	36.69	969.9	0.898	792.5	0.734
12	0.774	11.860	16.302	534.7	33.98	882.7	0.814	747.0	0.689
13	0.733	12.059	15.985	531.8	28.52	781.6	0.719	703.0	0.647

STA 12.000 MASS AVERAGED PROPERTIES
PT= 16.930 TT= 542.65 GAMMA=1.4018 PT-RAT= 1.152 TT-RAT= 1.046
RCU= 813.7 VM= 863.5 CZ= 846.4 MM=0.805 MABS=0.815 MREL=1.230

ROTOR1

WTF= 61.365 I=10 STA= 12.500 MTIP=118 AFLOW= 158.62 D*C=0. IN ROTOR D*H=0.
OPTX=TT OPTY=PT ITYPE=5 INBR=3 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-7.556	8.500	0.	0.	793.5	166.3	11.84	0.720
0.050	-7.565	8.321	-0.32	-0.0021	800.7	168.7	11.90	0.727
0.100	-7.576	8.141	-0.30	0.0074	809.6	172.0	11.99	0.736
0.200	-7.605	7.772	0.52	0.0194	828.8	175.8	11.97	0.756
0.300	-7.635	7.392	2.05	0.0145	855.3	187.6	12.37	0.783
0.400	-7.663	6.995	4.07	0.0304	882.3	202.1	12.90	0.811
0.500	-7.691	6.570	6.37	0.0244	902.4	214.6	13.38	0.832
0.600	-7.719	6.108	9.06	0.0150	912.2	229.2	14.10	0.844
0.700	-7.724	5.595	12.13	0.0202	908.1	244.2	15.05	0.841
0.800	-7.690	5.006	15.89	0.0243	881.3	253.2	16.03	0.815
0.900	-7.645	4.265	21.24	0.0112	814.6	246.2	16.81	0.751
0.950	-7.641	3.778	24.84	-0.0116	769.7	248.2	17.88	0.708
1.000	-7.657	3.114	27.97	-0.0568	702.4	236.8	18.63	0.644

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.889	12.334	17.672	560.3	59.25	1551.9	1.407	810.7	0.735
2	0.889	12.348	17.821	560.0	58.37	1526.6	1.386	818.3	0.743
3	0.889	12.338	17.968	559.9	57.37	1501.5	1.365	827.6	0.753
4	0.884	12.235	18.175	558.9	55.27	1455.0	1.328	847.3	0.773
5	0.874	12.093	18.477	559.5	52.56	1406.8	1.288	875.6	0.802
6	0.860	11.916	18.767	560.3	49.48	1358.0	1.248	905.2	0.832
7	0.841	11.717	18.912	560.2	46.32	1306.5	1.205	927.6	0.856
8	0.823	11.588	18.983	559.9	42.93	1245.9	1.152	940.6	0.870
9	0.806	11.558	18.949	558.9	39.29	1173.4	1.086	940.4	0.870
10	0.785	11.653	18.662	556.0	35.57	1083.5	1.002	917.0	0.848
11	0.752	11.940	17.930	549.6	31.87	959.2	0.884	851.0	0.784
12	0.728	12.147	17.541	546.3	28.53	876.1	0.805	808.7	0.744
13	0.682	12.381	16.873	540.4	24.00	768.9	0.705	741.3	0.680

STA 12.500 MASS AVERAGED PROPERTIES
PT= 18.411 TT= 557.42 GAMMA=1.4017 PT-RAT= 1.253 TT-RAT= 1.075
RCU= 1315.6 VM= 854.8 CZ= 837.7 MM=0.786 MABS=0.810 MREL=1.162

ROTOR1

WTF= 61.365	I=11		STA= 13.000	AFLOW= 153.32		D*C=0.	IN ROTOR
	OPTX=TT		MTIP=131	ITYPE=5 INBR=3		ABC=0.	D*H=0.
			OPTY=PT				ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-7.352	8.500	0.	0.	749.8	214.3	15.95	0.669
0.050	-7.351	8.320	-0.43	0.0199	762.7	219.4	16.05	0.682
0.100	-7.354	8.139	-0.47	0.0192	775.1	223.4	16.08	0.694
0.200	-7.366	7.774	0.23	0.0228	803.2	232.1	16.12	0.723
0.300	-7.381	7.401	1.73	0.0292	833.4	242.5	16.22	0.753
0.400	-7.396	7.013	3.67	0.0221	864.2	256.4	16.52	0.785
0.500	-7.412	6.601	6.07	0.0125	887.7	272.4	17.06	0.810
0.600	-7.428	6.154	8.76	0.0206	906.1	291.1	17.81	0.830
0.700	-7.424	5.658	11.81	0.0161	914.4	309.9	18.72	0.840
0.800	-7.385	5.092	15.61	0.0070	902.0	329.7	20.08	0.830
0.900	-7.344	4.382	21.24	-0.0109	848.6	331.1	21.32	0.780
0.950	-7.346	3.915	25.26	-0.0332	806.0	330.7	22.31	0.740
1.000	-7.374	3.269	29.72	-0.1324	723.5	320.1	23.87	0.661

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.879	13.445	18.591	572.3	59.75	1488.3	1.329	779.8	0.696
2	0.879	13.454	18.830	572.4	58.59	1463.3	1.309	793.7	0.710
3	0.879	13.433	19.025	572.2	57.42	1439.4	1.290	806.7	0.723
4	0.874	13.323	19.395	571.8	54.83	1394.3	1.255	836.0	0.752
5	0.866	13.118	19.702	571.5	51.92	1351.1	1.221	867.9	0.785
6	0.852	12.867	19.994	571.6	48.63	1307.5	1.188	901.4	0.819
7	0.831	12.632	20.203	571.6	45.15	1258.8	1.148	928.5	0.847
8	0.810	12.384	20.321	571.4	41.26	1205.3	1.104	951.7	0.871
9	0.788	12.165	20.297	570.3	36.98	1144.7	1.052	965.5	0.887
10	0.763	12.090	20.097	568.1	32.24	1066.4	0.981	960.4	0.883
11	0.729	12.183	19.289	561.4	27.52	956.8	0.879	910.9	0.837
12	0.702	12.280	18.719	556.8	24.08	882.9	0.810	871.2	0.800
13	0.653	12.596	17.850	549.5	19.54	767.7	0.702	791.1	0.723

STA 13.000 MASS AVERAGED PROPERTIES

PT= 19.656 TT= 569.16 GAMMA=1.4016 PT-RAT= 1.337 TT-RAT= 1.097
RCU= 1714.7 VM= 848.1 CZ= 830.6 MM=0.772 MABS=0.812 MREL=1.114

ROTOR1　　　　I=12　　　STA= 13.500　　　　　　　　　　　　　IN ROTOR
WTF= 61.365　　OPTX=TT　　MTIP=144　　AFLOW= 150.88　D+C=0.　D+H=0.
　　　　　　　　　　　　　OPTV=PT　　ITYPE=5　INBR=3　ABC=0.　ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-7.148	8.500	0.	0.	700.6	252.3	19.81	0.617
0.050	-7.138	8.318	-0.48	-0.0117	720.3	264.8	20.19	0.635
0.100	-7.131	8.137	-0.55	-0.0067	733.8	272.8	20.39	0.648
0.200	-7.127	7.774	0.01	0.0091	763.1	285.5	20.51	0.677
0.300	-7.127	7.407	1.38	0.0194	794.9	297.8	20.54	0.708
0.400	-7.128	7.029	3.40	0.0127	824.8	311.9	20.71	0.739
0.500	-7.132	6.630	5.79	0.0230	849.1	327.6	21.10	0.764
0.600	-7.137	6.198	8.44	0.0177	868.2	343.9	21.61	0.785
0.700	-7.124	5.720	11.59	0.0094	882.1	366.6	22.57	0.801
0.800	-7.081	5.177	15.64	-0.0102	879.5	392.6	24.06	0.801
0.900	-7.043	4.500	21.63	-0.0313	848.6	413.1	25.96	0.774
0.950	-7.051	4.057	26.05	-0.0519	817.2	413.0	26.81	0.747
1.000	-7.091	3.439	32.15	-0.1167	752.1	404.1	28.25	0.687

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.883	14.480	19.337	581.8	60.68	1430.9	1.261	744.7	0.656
2	0.883	14.538	19.763	583.5	59.09	1402.2	1.237	767.4	0.677
3	0.883	14.579	20.074	584.0	57.75	1375.3	1.215	782.8	0.691
4	0.878	14.545	20.596	584.0	54.92	1327.7	1.177	814.8	0.723
5	0.871	14.361	20.990	583.6	51.78	1284.8	1.145	848.9	0.756
6	0.856	14.118	21.308	583.2	48.39	1242.0	1.112	881.8	0.790
7	0.836	13.839	21.505	582.6	44.77	1196.1	1.076	910.1	0.819
8	0.814	13.504	21.536	581.4	40.81	1147.2	1.037	933.9	0.844
9	0.790	13.188	21.547	580.4	36.08	1091.5	0.991	955.3	0.867
10	0.764	12.956	21.392	578.5	30.64	1022.2	0.931	963.2	0.877
11	0.728	12.776	20.743	573.4	24.17	930.2	0.849	943.8	0.861
12	0.699	12.664	20.036	568.0	20.34	871.5	0.796	915.6	0.836
13	0.648	12.701	18.981	559.6	15.09	779.0	0.711	853.8	0.779

STA　13.500　MASS AVERAGED PROPERTIES
PT= 20.889　TT= 580.28　GAMMA=1.4015　PT-RAT= 1.421　TT-RAT= 1.119
RCU= 2093.2　VM= 818.1　CZ= 799.9　MM=0.736　MABS=0.796　MREL=1.053

ROTOR1

WTF= 61.365　I=13　STA= 14.000　AFLOW= 149.38　D+C=0.　IN ROTOR
　　　　　　OPTX=TT　MTIP=157　ITYPE=5　INBR=3　ABC=0.　D+H=0.
　　　　　　OPTV=PT　　　　　　　　　　　　　　　　ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-6.945	8.500	0.	0.	661.1	294.0	23.97	0.576
0.050	-6.925	8.316	-0.31	-0.0162	682.8	308.6	24.32	0.595
0.100	-6.909	8.135	-0.47	-0.0058	699.4	319.3	24.54	0.610
0.200	-6.888	7.774	-0.04	-0.0014	732.7	334.1	24.51	0.642
0.300	-6.873	7.413	1.30	-0.0085	767.4	350.4	24.54	0.676
0.400	-6.861	7.045	3.25	0.0073	797.6	366.3	24.67	0.706
0.500	-6.852	6.658	5.50	0.0125	816.4	377.9	24.84	0.726
0.600	-6.846	6.240	8.21	0.0094	832.1	394.4	25.36	0.744
0.700	-6.824	5.781	11.51	-0.0002	843.2	417.5	26.34	0.757
0.800	-6.777	5.263	15.84	-0.0122	845.2	447.6	27.91	0.762
0.900	-6.742	4.621	22.30	-0.0414	833.0	481.1	30.01	0.754
0.950	-6.756	4.204	27.13	-0.0626	817.4	495.6	31.23	0.742
1.000	-6.808	3.624	34.17	-0.0917	777.5	491.3	32.29	0.708

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.888	15.440	20.174	592.2	61.27	1375.4	1.197	723.5	0.630
2	0.888	15.532	20.687	594.2	59.49	1345.1	1.172	749.3	0.653
3	0.887	15.595	21.093	595.1	57.93	1317.3	1.150	768.9	0.671
4	0.883	15.580	21.730	595.1	54.78	1270.4	1.114	805.3	0.706
5	0.876	15.428	22.266	595.1	51.30	1227.3	1.081	843.6	0.743
6	0.864	15.199	22.657	594.6	47.71	1185.4	1.049	877.7	0.777
7	0.846	14.915	22.751	592.7	44.31	1140.9	1.015	899.6	0.800
8	0.827	14.587	22.764	591.1	40.34	1091.7	0.976	920.9	0.823
9	0.805	14.256	22.746	589.7	35.56	1036.5	0.930	940.9	0.845
10	0.780	13.926	22.625	588.0	29.65	972.5	0.877	956.4	0.862
11	0.744	13.476	22.104	584.1	21.87	897.6	0.813	961.9	0.871
12	0.714	13.158	21.519	580.0	16.77	853.7	0.775	955.9	0.868
13	0.662	12.826	20.328	571.1	10.80	791.5	0.721	919.7	0.838

STA　14.000　MASS AVERAGED PROPERTIES
PT= 22.107　TT= 590.86　GAMMA=1.4014　PT-RAT= 1.504　TT-RAT= 1.139
RCU= 2453.2　VM= 789.4　CZ= 770.6　MM=0.703　MABS=0.784　MREL=0.997

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ROTOR1              I=14        STA= 14.500                              IN ROTOR    D*H=0.
WTF= 61.365    OPTX=TT      MTIP=170    AFLOW= 148.88   D*C=0.           ABH=0.
                           OPTY=PT      ITYPE=5  INBR=3  ABC=0.

 PSIC     Z       R      PHI     CURV      VM      CU    ALPHAM    MM
 0.    -6.741   8.500   0.      0.       622.6   360.9   30.10   0.534
 0.050 -6.712   8.315  -0.24    0.0044   642.2   373.4   30.17   0.551
 0.100 -6.687   8.133  -0.36   -0.0106   656.8   381.7   30.16   0.565
 0.200 -6.648   7.774   0.08   -0.0155   695.0   399.4   29.88   0.601
 0.300 -6.618   7.419   1.40   -0.0054   734.2   414.3   29.44   0.638
 0.400 -6.593   7.060   3.16    0.0041   762.9   422.4   28.97   0.668
 0.500 -6.572   6.684   5.41   -0.0015   780.4   431.4   28.93   0.687
 0.600 -6.554   6.282   8.17   -0.0051   790.7   444.4   29.34   0.699
 0.700 -6.523   5.842  11.60   -0.0107   800.3   468.5   30.34   0.710
 0.800 -6.472   5.350  16.17   -0.0233   802.1   498.9   31.88   0.715
 0.900 -6.441   4.747  23.08   -0.0411   807.8   557.2   34.60   0.725
 0.950 -6.461   4.359  28.30   -0.0590   804.9   579.4   35.75   0.726
 1.000 -6.525   3.823  35.75   -0.0685   793.1   588.6   36.58   0.721

SL  BLDBLK    PS      PT       TT    BETAM    VREL    MREL    VABS    MABS
 1  0.897  16.676  21.561   608.9   61.34  1298.2  1.113   719.6   0.617
 2  0.897  16.804  22.100   610.0   59.59  1268.6  1.089   742.8   0.638
 3  0.896  16.894  22.510   610.0   58.06  1241.5  1.068   759.7   0.654
 4  0.892  16.912  23.315   610.0   54.45  1195.4  1.033   801.6   0.693
 5  0.887  16.707  23.888   609.1   50.63  1157.5  1.007   843.0   0.733
 6  0.877  16.395  24.113   606.4   47.18  1122.5  0.982   872.1   0.763
 7  0.863  16.076  24.138   603.5   43.79  1081.1  0.951   891.7   0.784
 8  0.848  15.740  24.039   600.8   40.03  1032.6  0.913   907.0   0.802
 9  0.831  15.389  24.018   599.2   35.11   978.2  0.868   927.3   0.823
10  0.809  14.995  23.867   597.2   29.03   917.4  0.818   944.6   0.842
11  0.776  14.338  23.760   596.5   19.15   855.1  0.767   981.4   0.881
12  0.747  13.800  23.210   593.0   13.27   827.0  0.746   991.8   0.894
13  0.696  13.058  22.032   584.9    6.19   797.7  0.725   987.7   0.897

        STA  14.500   MASS AVERAGED PROPERTIES
PT= 23.556  TT= 603.10  GAMMA=1.4012  PT-RAT= 1.603  TT-RAT=  1.163
RCU= 2869.8  VM= 754.2   CZ= 734.7  MM=0.664  MABS=0.774  MREL=0.933
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ROTOR1

WTF= 61.365   I=15   OPTX=TT   STA= 15.000   AFLOW= 148.57   D+C=0.   IN ROTOR
                                  MTIP=183   OPTY=PT   ITYPE=5 INBR=3   ABC=0.   D+H=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-6.538	8.500	0.	0.	580.6	457.1	38.21	0.489
0.050	-6.499	8.314	-0.44	0.0291	600.6	463.2	37.64	0.507
0.100	-6.465	8.132	-0.51	0.0337	618.0	465.2	36.97	0.523
0.200	-6.409	7.775	0.22	-0.0054	661.2	470.8	35.45	0.564
0.300	-6.364	7.426	1.61	-0.0230	701.7	478.7	34.30	0.603
0.400	-6.325	7.075	3.39	-0.0343	728.0	484.1	33.62	0.630
0.500	-6.292	6.711	5.64	-0.0271	744.2	495.6	33.66	0.647
0.600	-6.263	6.324	8.40	-0.0225	753.0	509.8	34.10	0.658
0.700	-6.224	5.905	11.92	-0.0251	758.8	531.0	34.98	0.666
0.800	-6.168	5.439	16.62	-0.0269	765.5	566.4	36.50	0.676
0.900	-6.140	4.878	23.68	-0.0227	784.2	631.0	38.82	0.698
0.950	-6.166	4.521	29.00	-0.0140	801.2	667.1	39.78	0.719
1.000	-6.241	4.031	36.90	-0.0425	808.7	709.3	41.25	0.733

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.907	18.219	23.648	632.9	60.90	1193.6	1.005	738.9	0.622
2	0.906	18.329	24.151	631.9	59.11	1170.0	0.987	758.5	0.640
3	0.906	18.359	24.493	629.9	57.50	1150.0	0.974	773.5	0.655
4	0.903	18.237	25.132	626.3	53.74	1117.8	0.954	811.7	0.692
5	0.899	17.955	25.599	623.2	49.84	1088.2	0.935	849.5	0.730
6	0.893	17.649	25.790	619.4	46.39	1055.6	0.913	874.3	0.756
7	0.883	17.355	25.884	616.5	42.78	1013.9	0.882	894.1	0.778
8	0.873	17.002	25.783	613.5	38.83	966.7	0.845	909.3	0.795
9	0.861	16.605	25.652	610.9	33.96	914.9	0.803	926.2	0.813
10	0.845	16.098	25.572	609.3	27.20	860.7	0.760	952.3	0.840
11	0.818	15.166	25.544	609.2	16.33	817.1	0.727	1006.5	0.896
12	0.792	14.326	25.191	607.4	9.27	811.8	0.728	1042.6	0.935
13	0.743	13.260	24.388	602.8	0.15	808.7	0.733	1075.7	0.975

STA   15.000   MASS AVERAGED PROPERTIES
STA   15.000   TT= 617.70   VM= 721.2

PT= 25.358   TT= 617.70   GAMMA=1.4010   PT-RAT= 1.726   TT-RAT= 1.191
RCU= 3367.1   VM= 721.2   CZ= 701.0   MM=0.628   MABS=0.775   MREL=0.866

ROTOR1

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-6.334	8.500	0.	0.	545.0	530.1	44.21	0.453
0.050	-6.285	8.312	-0.73	0.0184	570.8	532.3	43.00	0.476
0.100	-6.242	8.129	-0.68	-0.0070	593.0	533.7	41.99	0.497
0.200	-6.170	7.776	0.52	-0.0384	639.0	536.5	40.02	0.540
0.300	-6.110	7.434	2.19	-0.0571	678.3	540.5	38.55	0.577
0.400	-6.057	7.092	4.13	-0.0619	703.5	543.0	37.67	0.603
0.500	-6.012	6.740	6.40	-0.0664	717.1	553.7	37.67	0.618
0.600	-5.972	6.368	9.10	-0.0604	722.3	570.5	38.30	0.625
0.700	-5.924	5.969	12.53	-0.0447	726.6	593.8	39.26	0.632
0.800	-5.863	5.532	17.19	-0.0350	735.3	629.0	40.55	0.643
0.900	-5.838	5.011	23.94	-0.0050	762.9	693.7	42.28	0.674
0.950	-5.871	4.686	29.02	0.0120	789.2	732.4	42.86	0.704
1.000	-5.958	4.245	36.75	0.0575	836.2	798.1	43.67	0.757

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.918	19.344	25.307	651.1	60.67	1112.5	0.924	760.3	0.632
2	0.918	19.406	25.799	648.7	58.59	1095.1	0.913	780.5	0.651
3	0.917	19.418	26.195	646.2	56.64	1078.5	0.903	797.8	0.668
4	0.916	19.301	26.884	641.3	52.60	1052.0	0.888	834.3	0.705
5	0.914	19.022	27.326	636.8	48.67	1027.1	0.874	867.4	0.738
6	0.911	18.707	27.477	631.9	45.20	998.4	0.856	888.7	0.762
7	0.906	18.421	27.558	628.4	41.56	958.3	0.826	906.0	0.781
8	0.901	18.101	27.511	625.5	37.45	909.9	0.788	920.4	0.797
9	0.895	17.687	27.409	622.9	32.32	859.8	0.748	938.3	0.816
10	0.886	17.075	27.302	621.0	25.27	813.1	0.712	967.7	0.847
11	0.870	15.921	27.270	620.9	14.02	786.4	0.695	1031.2	0.911
12	0.848	14.909	26.961	619.6	6.82	794.8	0.709	1076.7	0.960
13	0.801	13.273	26.567	618.3	-3.36	837.6	0.758	1155.9	1.047

STA 15.500 MASS AVERAGED PROPERTIES
PT= 27.088 TT= 630.96 GAMMA=1.4008 PT-RAT= 1.843 TT-RAT= 1.216
RCU= 3819.2 VM= 696.4 CZ= 675.8 MM=0.601 MABS=0.785 MREL=0.812

ROTOR1 STA= 16.000

WTF= 61.365 I=17 OPTX=TT MTIP=209 OPTY=PT AFLOW= 148.43 ITYPE=6 INBR=3 D+C=0. ABC=0. D+H=0. ABH=0. TE ROTOR

PSIC	Z	R	PHI	CURV	BETAM	TT	PT	PS
0.	-6.131	8.500	0.	0.	60.73	664.4	26.560	20.164
0.050	-6.072	8.309	-0.50	-0.0573	57.91	661.7	27.120	20.140
0.100	-6.020	8.127	-0.12	-0.0810	55.65	658.8	27.560	20.128
0.200	-5.931	7.780	1.46	-0.0984	51.26	653.7	28.390	20.052
0.300	-5.856	7.446	3.34	-0.1001	47.38	649.0	28.940	19.898
0.400	-5.790	7.114	5.30	-0.0900	43.70	644.7	29.280	19.696
0.500	-5.732	6.774	7.50	-0.0708	40.04	640.8	29.380	19.448
0.600	-5.680	6.417	10.04	-0.0502	35.73	637.7	29.350	19.110
0.700	-5.624	6.038	13.16	-0.0271	30.25	635.1	29.280	18.643
0.800	-5.559	5.627	17.33	0.0191	22.92	633.0	29.160	17.922
0.900	-5.537	5.144	23.42	0.0603	12.42	631.6	28.920	16.780
0.950	-5.576	4.847	27.60	0.1353	4.83	631.5	28.770	15.812
1.000	-5.675	4.449	34.61	0.1558	-6.08	632.3	28.650	14.296

SL	BLDBLK	VM	VREL	CU	MREL	ALPHAM	VABS	MABS
1	0.926	513.6	1050.5	583.6	0.865	48.65	777.4	0.640
2	0.927	552.1	1039.3	585.9	0.860	46.70	805.1	0.666
3	0.927	579.2	1026.4	586.8	0.853	45.37	824.5	0.685
4	0.927	627.7	1003.0	590.6	0.841	43.26	861.9	0.723
5	0.928	661.0	976.1	595.6	0.824	42.02	889.7	0.751
6	0.928	682.9	944.6	602.8	0.803	41.43	910.9	0.774
7	0.928	692.8	904.9	613.3	0.773	41.52	925.3	0.791
8	0.928	697.2	858.8	630.9	0.737	42.15	940.3	0.807
9	0.928	702.3	813.0	655.9	0.702	43.04	961.0	0.829
10	0.928	714.1	775.3	691.1	0.674	44.06	993.7	0.863
11	0.930	731.9	749.4	746.6	0.657	45.57	1045.5	0.917
12	0.914	752.3	755.0	791.8	0.667	46.46	1092.1	0.965
13	0.875	783.6	788.0	868.6	0.706	47.95	1169.9	1.048

STA 16.000 MASS AVERAGED PROPERTIES

PT= 28.783 TT= 643.26 GAMMA=1.4006 PT-RAT= 1.959 TT-RAT= 1.240
RCU= 4238.7 VM= 673.8 CZ= 654.3 MM=0.577 MABS=0.798 MREL=0.764

AVERAGE PCT IMM	RAD	BLADE SPEED IN	OUT	ACC PT RATIO	ACC TT RATIO	EFFICIENCY AD.	POLY	AXIAL VEL R
0.	8.500	1500.0	1500.0	1.8073	1.2809	0.656	0.683	0.622
3.7	8.315	1468.5	1466.3	1.8454	1.2757	0.694	0.719	0.668
7.4	8.133	1436.2	1434.2	1.8753	1.2701	0.729	0.752	0.700
14.8	7.770	1369.4	1372.9	1.9318	1.2603	0.796	0.814	0.757
22.2	7.403	1298.8	1313.9	1.9692	1.2512	0.851	0.864	0.799
29.8	7.023	1223.5	1255.3	1.9924	1.2429	0.897	0.906	0.835
37.9	6.623	1142.2	1195.4	1.9992	1.2354	0.930	0.937	0.866
46.6	6.192	1052.8	1132.5	1.9971	1.2294	0.953	0.957	0.907
56.2	5.717	952.3	1065.5	1.9924	1.2244	0.971	0.973	0.967
67.1	5.181	835.6	993.0	1.9842	1.2204	0.982	0.984	1.058
80.3	4.524	689.0	907.8	1.9679	1.2177	0.981	0.983	1.201
88.8	4.104	593.0	855.3	1.9577	1.2175	0.974	0.976	1.326
100.0	3.551	468.2	785.1	1.9495	1.2190	0.960	0.964	1.354

FREE

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FREE
WTF= 61.365      I=18        STA= 17.000   AFLOW= 146.32   D*C=0.     FREE
                 OPTX=DPP    MTIP=222      ITYPE=0 INBR=0  ABC=0.     D*H=0.
                 OPTY=FREE                                            ABH=0.
```

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-5.700	8.500	0.	0.	501.7	583.6	49.32	0.413
0.050	-5.638	8.311	0.87	-0.0524	552.8	585.8	46.66	0.457
0.100	-5.585	8.134	1.75	-0.0690	587.9	586.3	44.92	0.489
0.200	-5.497	7.799	3.49	-0.0647	644.9	589.1	42.41	0.541
0.300	-5.427	7.479	5.13	-0.0459	679.5	593.0	41.11	0.575
0.400	-5.372	7.159	6.73	-0.0292	702.7	598.9	40.44	0.598
0.500	-5.331	6.832	8.46	-0.0121	714.9	608.2	40.39	0.612
0.600	-5.304	6.487	10.51	0.0070	720.9	624.2	40.89	0.620
0.700	-5.294	6.116	13.12	0.0310	726.2	647.5	41.72	0.628
0.803	-5.304	5.706	16.73	0.0597	729.1	681.5	43.07	0.634
0.900	-5.351	5.223	22.34	0.1262	734.0	735.3	45.05	0.643
0.950	-5.405	4.933	25.96	0.1644	741.3	777.9	46.38	0.653
1.000	-5.520	4.552	32.88	0.1656	719.9	848.9	49.70	0.638

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.940	20.260	26.533	664.4	61.30	1044.7	0.859	769.6	0.633
2	0.940	20.114	27.093	661.7	57.89	1039.9	0.861	805.4	0.667
3	0.940	20.014	27.532	658.8	55.30	1032.7	0.859	830.3	0.691
4	0.940	19.854	28.390	653.7	50.68	1017.7	0.854	873.5	0.733
5	0.940	19.683	28.940	649.0	46.93	995.0	0.842	901.8	0.763
6	0.940	19.470	29.280	644.7	43.40	967.1	0.823	923.3	0.786
7	0.940	19.204	29.380	640.8	39.89	931.6	0.798	938.6	0.803
8	0.940	18.863	29.350	637.7	35.84	889.2	0.765	953.5	0.820
9	0.940	18.419	29.280	635.1	30.74	844.9	0.730	972.9	0.841
10	0.940	17.841	29.160	633.0	24.05	796.4	0.694	998.1	0.868
11	0.940	16.903	28.920	631.6	14.25	757.3	0.663	1039.0	0.910
12	0.940	16.144	28.770	631.5	7.12	747.1	0.658	1074.6	0.947
13	0.940	15.319	28.564	632.3	-3.62	721.3	0.639	1113.1	0.987

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          STA  17.000  MASS AVERAGED PROPERTIES
PT= 28.777  TT= 643.26  GAMMA=1.4006  PT-RAT= 1.958  TT-RAT=  1.240
RCU= 4238.7  VM= 686.2   CZ= 667.6   MM=0.588   MABS=0.803  MREL=0.778
```

STATOR   STA= 18.000   LE STATOR
                I=19   MTIP=235   AFLOW= 141.54   D*C=0.   D*H=0.
WTF= 61.365   OPTX=DPP   OPTY=FREE   ITYPE=1 INBR=4   ABC=0.   ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-5.250	8.500	0.	0.	546.3	583.6	46.89	0.451
0.050	-5.192	8.322	1.58	-0.0031	586.7	585.0	44.92	0.487
0.100	-5.142	8.153	2.73	-0.0084	617.3	585.0	43.46	0.515
0.200	-5.062	7.831	4.48	-0.0151	671.3	586.7	41.16	0.565
0.300	-5.003	7.521	5.90	-0.0166	705.8	589.6	39.88	0.598
0.400	-4.961	7.210	7.27	-0.0163	730.0	594.7	39.17	0.623
0.500	-4.937	6.891	8.77	-0.0144	744.4	602.9	39.01	0.639
0.600	-4.933	6.556	10.56	-0.0115	753.7	617.6	39.33	0.650
0.700	-4.953	6.194	12.88	-0.0070	762.9	639.3	39.97	0.662
0.800	-5.004	5.793	16.11	0.0094	770.9	671.2	41.05	0.673
0.900	-5.108	5.319	21.17	0.0298	773.8	722.1	43.02	0.680
0.950	-5.202	5.028	24.71	0.0295	759.9	763.2	45.12	0.670
1.000	-5.375	4.643	31.23	0.3271	802.6	832.3	46.04	0.717

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.940	19.815	26.533	664.4	59.20	1066.9	0.880	799.4	0.660
2	0.940	19.753	27.093	661.7	56.42	1060.6	0.880	828.5	0.687
3	0.940	19.688	27.532	658.8	54.13	1053.6	0.878	850.5	0.709
4	0.940	19.543	28.390	653.7	49.83	1040.7	0.876	891.6	0.750
5	0.940	19.364	28.940	649.0	46.26	1020.9	0.866	919.7	0.780
6	0.940	19.136	29.280	644.7	42.87	996.1	0.850	941.5	0.804
7	0.940	18.845	29.380	640.8	39.48	964.4	0.828	957.9	0.822
8	0.940	18.472	29.350	637.7	35.58	926.8	0.800	974.5	0.841
9	0.940	17.997	29.280	635.1	30.75	887.6	0.770	995.3	0.863
10	0.940	17.385	29.160	633.0	24.49	847.1	0.739	1022.2	0.892
11	0.940	16.536	28.920	631.6	15.64	803.6	0.706	1058.4	0.930
12	0.940	16.099	28.770	631.5	9.28	769.9	0.679	1076.9	0.949
13	0.940	14.508	28.564	632.3	-0.92	802.7	0.717	1156.3	1.033

STA 18.000 MASS AVERAGED PROPERTIES
PT= 28.777 TT= 643.26 GAMMA=1.4007 PT-RAT= 1.958 TT-RAT= 1.240
RCU= 4238.7 VM= 719.3 CZ= 700.7 MM=0.618 MABS=0.822 MREL=0.810

STATOR

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STATOR                          STA= 19.000                              IN STATOR
                I=20            MTIP=248    AFLOW= 126.02    D*C=0.   D*H=0.
WTF= 61.365     OPTX=DPP OPTY=BETM ITYPE=2 INBR=4   ABC=0.   ABH=0.
```

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-4.770	8.500	0.	0.	611.6	373.6	31.42	0.501
0.050	-4.723	8.334	1.17	0.0336	640.9	382.9	30.86	0.527
0.100	-4.683	8.174	2.13	0.0541	664.6	389.6	30.38	0.549
0.200	-4.616	7.866	3.74	0.0727	710.4	405.1	29.69	0.593
0.300	-4.566	7.566	5.17	0.0744	743.1	416.8	29.29	0.625
0.400	-4.531	7.265	6.61	0.0696	767.9	428.0	29.13	0.650
0.500	-4.512	6.957	8.20	0.0603	784.6	438.8	29.22	0.668
0.600	-4.508	6.635	10.07	0.0514	799.3	452.2	29.50	0.684
0.700	-4.524	6.292	12.35	0.0491	817.1	472.7	30.05	0.704
0.800	-4.565	5.918	15.31	0.0522	840.2	503.5	30.93	0.729
0.900	-4.641	5.494	19.48	0.0885	872.9	546.6	32.05	0.764
0.950	-4.696	5.253	22.41	0.1161	899.0	575.2	32.61	0.791
1.000	-4.770	4.975	26.23	0.1265	931.4	614.0	33.40	0.826

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.875	21.025	26.533	664.4	61.50	1281.7	1.049	716.7	0.587
2	0.877	21.009	27.093	661.7	59.50	1262.6	1.038	746.5	0.614
3	0.878	20.960	27.532	658.8	57.74	1245.1	1.029	770.4	0.637
4	0.879	20.792	28.390	653.7	54.15	1212.9	1.012	817.8	0.682
5	0.880	20.557	28.940	649.0	51.02	1181.3	0.993	852.0	0.716
6	0.881	20.269	29.280	644.7	48.04	1148.5	0.972	879.1	0.744
7	0.880	19.929	29.380	640.8	45.15	1112.6	0.948	899.0	0.766
8	0.880	19.515	29.350	637.7	41.96	1074.8	0.920	918.3	0.786
9	0.878	18.959	29.280	635.1	37.97	1036.5	0.892	944.0	0.813
10	0.875	18.190	29.160	633.0	32.77	999.3	0.866	979.5	0.849
11	0.867	17.074	28.920	631.6	25.85	970.0	0.849	1029.9	0.901
12	0.857	16.282	28.770	631.5	21.37	965.4	0.850	1067.3	0.939
13	0.837	15.272	28.564	632.3	15.82	968.0	0.858	1115.6	0.989

```
          STA  19.000  MASS AVERAGED PROPERTIES
PT= 28.777  TT= 643.26  GAMMA=1.4005  PT-RAT= 1.958  TT-RAT=  1.240
RCU= 3076.0  VM= 777.2  CZ= 759.7  MM=0.663  MABS=0.768  MREL=0.943
```

STATOR

I=21   MTIP=261   AFLOW= 118.85   D*C=O.   D*H=O.

WTF= 61.365   OPTX=DPP   OPTY=BETM   ITYPE=2   INBR=4   ABC=O.   ABH=O.

IN STATOR

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-4.300	8.500	0.	0.	653.2	261.6	21.82	0.534
0.050	-4.277	8.341	0.67	0.0052	683.3	271.1	21.64	0.561
0.100	-4.257	8.186	1.34	0.0105	705.8	277.8	21.49	0.583
0.200	-4.225	7.887	2.70	0.0200	747.3	290.4	21.24	0.622
0.300	-4.200	7.595	4.11	0.0268	774.4	297.8	21.03	0.649
0.400	-4.183	7.302	5.59	0.0322	793.4	303.0	20.90	0.669
0.500	-4.174	7.002	7.24	0.0387	804.8	306.7	20.86	0.682
0.600	-4.173	6.691	9.11	0.0473	814.6	311.5	20.93	0.693
0.700	-4.180	6.364	11.28	0.0572	827.8	320.2	21.15	0.707
0.800	-4.199	6.014	13.93	0.0742	846.9	335.1	21.59	0.727
0.900	-4.233	5.630	17.35	0.0845	872.5	356.1	22.20	0.753
0.950	-4.261	5.419	19.55	0.0978	890.2	369.1	22.52	0.771
1.000	-4.300	5.188	22.50	0.1259	912.6	385.7	22.91	0.793

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.849	21.208	26.533	664.4	62.19	1400.1	1.144	703.7	0.575
2	0.851	21.178	27.093	661.7	60.36	1381.5	1.135	735.1	0.604
3	0.852	21.143	27.532	658.8	58.83	1363.7	1.126	758.5	0.626
4	0.855	21.057	28.390	653.7	55.84	1331.0	1.108	801.8	0.668
5	0.857	20.943	28.940	649.0	53.39	1298.6	1.089	829.7	0.696
6	0.859	20.797	29.280	644.7	51.16	1265.2	1.067	849.3	0.716
7	0.860	20.609	29.380	640.8	49.10	1229.1	1.042	861.3	0.730
8	0.860	20.356	29.35C	637.7	46.86	1191.4	1.014	872.1	0.742
9	0.858	19.996	29.280	635.1	44.12	1153.2	0.985	887.6	0.758
10	0.855	19.465	29.160	633.0	40.61	1115.6	0.958	910.8	0.782
11	0.847	18.708	28.920	631.6	36.15	1080.6	0.933	942.4	0.814
12	0.840	18.218	28.770	631.5	33.41	1066.5	0.924	963.7	0.835
13	0.828	17.601	28.564	632.3	30.14	1055.2	0.917	990.8	0.861

STA 20.000 MASS AVERAGED PROPERTIES

PT= 28.777 TT= 643.26 GAMMA=1.4003 PT-RAT= 1.958 TT-RAT= 1.240

RCU= 2144.6 VM= 797.1 CZ= 783.4 MM=0.675 MABS=0.725 MREL=1.035

STATOR

	I=22		STA= 21.000				IN STATOR	
WTF= 61.365	OPTX=DPP		MTIP=274	AFLOW= 115.13		D+C=O.	D+H=O.	
			OPTY=BETM	ITYPE=2	INBR=4	ABC=O.	ABH=O.	

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-3.800	8.500	0.	0.	671.2	169.8	14.20	0.548
0.050	-3.800	8.346	0.56	0.0032	702.3	175.4	14.02	0.576
0.100	-3.800	8.196	1.13	0.0057	725.3	178.9	13.86	0.598
0.200	-3.800	7.905	2.32	0.0111	767.2	185.5	13.59	0.638
0.300	-3.800	7.621	3.59	0.0180	793.5	189.2	13.41	0.664
0.400	-3.800	7.337	4.95	0.0261	811.4	191.6	13.29	0.683
0.500	-3.800	7.047	6.43	0.0355	821.4	192.8	13.21	0.695
0.600	-3.800	6.748	8.10	0.0463	829.3	193.8	13.16	0.704
0.700	-3.800	6.435	10.00	0.0583	839.4	196.9	13.20	0.715
0.800	-3.800	6.107	12.22	0.0724	852.2	203.7	13.44	0.729
0.900	-3.800	5.756	14.99	0.0984	869.1	213.3	13.79	0.746
0.950	-3.800	5.570	16.64	0.1117	881.9	218.2	13.90	0.758
1.000	-3.800	5.376	18.63	0.1266	896.7	223.2	13.98	0.772

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.849	21.366	26.533	664.4	63.23	1489.9	1.216	692.3	0.565
2	0.850	21.343	27.093	661.7	61.57	1475.3	1.211	723.9	0.594
3	0.851	21.318	27.532	658.8	60.22	1460.3	1.204	747.0	0.616
4	0.853	21.259	28.390	653.7	57.61	1432.3	1.191	789.3	0.656
5	0.855	21.180	28.940	649.0	55.53	1401.8	1.174	815.7	0.683
6	0.856	21.070	29.280	644.7	53.66	1369.4	1.153	833.7	0.702
7	0.858	20.922	29.380	640.8	51.99	1333.8	1.128	843.7	0.714
8	0.858	20.723	29.350	637.7	50.24	1296.8	1.101	851.7	0.723
9	0.859	20.454	29.280	635.1	48.20	1259.3	1.073	862.2	0.734
10	0.858	20.092	29.160	633.0	45.72	1220.7	1.044	876.2	0.749
11	0.855	19.574	28.920	631.6	42.72	1182.9	1.015	894.9	0.768
12	0.854	19.225	28.770	631.5	40.93	1167.3	1.003	908.5	0.781
13	0.852	18.818	28.564	632.3	38.97	1153.4	0.993	924.1	0.796

STA 21.000 MASS AVERAGED PROPERTIES

PT= 28.777 TT= 643.26 GAMMA=1.4003 PT-RAT= 1.958 TT-RAT= 1.240
RCU= 1351.4 VM= 809.4 CZ= 799.1 MM=0.683 MABS=0.703 MREL=1.119

STATOR

WTF= 61.365   I=23   STA= 22.000   AFLOW= 114.71   IN STATOR
                     WTIP=287   ITYPE=2 INBR=4
               OPTX=DPP   D+C=0.   D+H=0.
               OPTY=BETM   ABC=0.   ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-3.204	8.500	0.	0.	663.1	83.6	7.19	0.540
0.050	-3.211	8.351	0.55	-0.0031	694.9	86.3	7.08	0.569
0.100	-3.218	8.207	1.06	-0.0015	717.8	87.8	6.97	0.590
0.200	-3.232	7.927	2.03	0.0070	760.0	90.6	6.79	0.630
0.300	-3.246	7.653	3.05	0.0160	786.4	91.8	6.66	0.657
0.400	-3.259	7.380	4.16	0.0249	804.3	92.5	6.56	0.675
0.500	-3.272	7.102	5.39	0.0335	814.0	92.5	6.48	0.686
0.600	-3.287	6.815	6.77	0.0434	821.1	92.6	6.43	0.695
0.700	-3.301	6.516	8.36	0.0552	830.0	93.5	6.43	0.705
0.800	-3.316	6.203	10.37	0.0581	840.2	95.8	6.51	0.716
0.900	-3.333	5.870	12.74	0.0645	848.3	98.9	6.65	0.724
0.950	-3.341	5.695	14.00	0.0825	854.0	100.6	6.72	0.730
1.000	-3.350	5.512	15.23	0.1249	864.0	102.6	6.77	0.739

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.880	21.693	26.533	664.4	64.91	1563.9	1.274	668.3	0.545
2	0.880	21.683	27.093	661.7	63.40	1551.7	1.271	700.2	0.573
3	0.881	21.675	27.532	658.8	62.18	1538.2	1.265	723.2	0.595
4	0.882	21.645	28.390	653.7	59.85	1513.0	1.255	765.4	0.635
5	0.883	21.584	28.940	649.0	58.01	1484.2	1.239	791.7	0.661
6	0.883	21.487	29.280	644.7	56.38	1452.8	1.220	809.6	0.680
7	0.884	21.351	29.380	640.8	54.96	1417.7	1.196	819.2	0.691
8	0.885	21.171	29.350	637.7	53.51	1380.7	1.168	826.3	0.699
9	0.886	20.933	29.280	635.1	51.84	1343.5	1.141	835.3	0.709
10	0.886	20.639	29.160	633.0	49.93	1305.2	1.112	845.7	0.720
11	0.886	20.304	28.920	631.6	47.84	1264.0	1.079	854.1	0.729
12	0.887	20.094	28.770	631.5	46.64	1243.9	1.063	859.9	0.735
13	0.887	19.782	28.564	632.3	45.21	1226.3	1.048	870.1	0.744

STA 22.000 MASS AVERAGED PROPERTIES

PT= 28.777 TT= 643.26 GAMMA=1.4002 PT-RAT= 1.958 TT-RAT= 1.240
RCU= 653.6 VM= 798.7 CZ= 791.5 MM=0.672 MABS=0.676 MREL=1.184

36

STATOR   I=24   STA= 23.000

WTF= 61.365   MTIP=300   AFLOW= 118.17   DPTX=DPP   DPTY=BETM   ITYPE=3   INBR=4

TE STATOR
D*C=0.   D*H=0.
ABC=0.   ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-2.567	8.500	0.	0.	658.1	0.	0.	0.536
0.050	-2.581	8.357	0.50	0.0063	685.2	0.	0.	0.560
0.100	-2.595	8.218	0.92	0.0091	702.8	0.	0.	0.577
0.200	-2.622	7.947	1.69	0.0125	744.8	0.	0.	0.616
0.300	-2.648	7.682	2.46	0.0184	770.2	0.	0.	0.642
0.400	-2.674	7.418	3.29	0.0268	788.1	0.	0.	0.660
0.500	-2.700	7.150	4.21	0.0379	797.4	0.	0.	0.671
0.600	-2.728	6.874	5.25	0.0506	803.1	0.	0.	0.678
0.700	-2.756	6.587	6.46	0.0656	811.7	0.	0.	0.687
0.800	-2.785	6.290	8.03	0.0938	831.5	0.	0.	0.707
0.900	-2.816	5.976	9.89	0.1249	831.5	0.	0.	0.708
0.950	-2.833	5.809	10.80	0.1318	831.7	0.	0.	0.708
1.000	-2.850	5.631	11.52	0.1267	820.0	0.	0.	0.697

SL	BLDBLK	PS	PT	TT	BETAM	VREL	VM	MREL	VABS	MABS
1	0.940	21.481	26.109	664.4	66.31	1638.0	658.1	1.333	658.1	0.536
2	0.940	21.483	26.581	661.7	65.08	1626.2	685.2	1.330	685.2	0.560
3	0.940	21.478	26.910	658.8	64.14	1611.6	702.8	1.323	702.8	0.577
4	0.940	21.462	27.731	653.7	62.03	1587.9	744.8	1.314	744.8	0.616
5	0.940	21.431	28.269	649.0	60.40	1559.2	770.2	1.299	770.2	0.642
6	0.940	21.375	28.639	644.7	58.95	1528.0	788.1	1.280	788.1	0.660
7	0.940	21.284	28.781	640.8	57.71	1492.6	797.4	1.256	797.4	0.671
8	0.940	21.147	28.769	637.7	56.49	1454.8	803.1	1.228	803.1	0.678
9	0.940	20.958	28.750	635.1	55.07	1417.8	811.7	1.201	811.7	0.687
10	0.940	20.667	28.851	633.0	53.17	1386.9	831.5	1.179	831.5	0.707
11	0.940	20.220	28.250	631.6	51.74	1343.0	831.5	1.143	831.5	0.708
12	0.940	19.938	27.860	631.5	50.95	1320.0	831.7	1.124	831.7	0.708
13	0.940	19.635	27.159	632.3	50.47	1288.4	820.0	1.095	820.0	0.697

STA 23.000   MASS AVERAGED PROPERTIES

PT= 28.163   TT= 643.26   GAMMA=1.4001   PT-RAT= 1.916   TT-RAT= 1.240

RCU= 0.   VM= 782.6   CZ= 778.4   MM=0.657   MABS=0.657   MREL=1.244

AVERAGE PCT IMM	RAD	BLADE SPEED IN	OUT	ACC PT RATIO	ACC TT RATIO	EFFICIENCY AD.	POLY	AXIAL VEL R
0.	8.500			1.7766	1.2809	0.635	0.663	1.205
4.8	8.340			1.8087	1.2757	0.669	0.696	1.168
9.4	8.186			1.8311	1.2701	0.699	0.723	1.140
18.2	7.889			1.8870	1.2603	0.765	0.785	1.112
26.7	7.601			1.9236	1.2512	0.818	0.834	1.096
35.3	7.314			1.9488	1.2429	0.865	0.877	1.087
44.0	7.021			1.9584	1.2354	0.900	0.909	1.081
53.1	6.715			1.9576	1.2294	0.923	0.930	1.079
62.7	6.391			1.9563	1.2244	0.942	0.948	1.085
73.1	6.042			1.9632	1.2204	0.965	0.968	1.112
84.8	5.648			1.9223	1.2177	0.944	0.949	1.135
91.6	5.419			1.8957	1.2175	0.923	0.929	1.184
100.0	5.137			1.8480	1.2190	0.876	0.887	1.171

EXIT STA= 24.000 FREE

WTF= 61.365 I=25 MTIP=313 AFLOW= 116.57 D+C=0. D+H=0.

OPTX=DPP OPTY=FREE ITYPE=0 INBR=0 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-2.000	8.500	0.	0.	675.7	0.	0.	0.551
0.050	-2.000	8.361	0.32	0.0040	702.4	0.	0.	0.575
0.100	-2.000	8.226	0.63	0.0080	719.7	0.	0.	0.592
0.200	-2.000	7.963	1.18	0.0159	761.5	0.	0.	0.631
0.300	-2.000	7.706	1.68	0.0234	787.9	0.	0.	0.658
0.400	-2.000	7.450	2.16	0.0313	807.1	0.	0.	0.678
0.500	-2.000	7.192	2.64	0.0402	817.9	0.	0.	0.690
0.600	-2.000	6.927	3.13	0.0510	824.8	0.	0.	0.698
0.700	-2.000	6.654	3.63	0.0644	834.8	0.	0.	0.709
0.800	-2.000	6.373	4.11	0.0793	854.0	0.	0.	0.728
0.900	-2.000	6.077	4.60	0.0997	850.7	0.	0.	0.726
0.950	-2.000	5.921	4.85	0.1151	848.6	0.	0.	0.724
1.000	-2.000	5.757	5.28	0.1260	835.5	0.	0.	0.711

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.950	21.247	26.109	664.4	65.75	1645.2	1.341	675.7	0.551
2	0.950	21.244	26.581	661.7	64.55	1634.2	1.338	702.4	0.575
3	0.950	21.236	26.910	658.8	63.63	1620.3	1.332	719.7	0.592
4	0.950	21.203	27.731	653.7	61.54	1598.3	1.325	761.5	0.631
5	0.950	21.145	28.269	649.0	59.91	1571.6	1.312	787.9	0.658
6	0.950	21.058	28.639	644.7	58.45	1542.7	1.295	807.1	0.678
7	0.950	20.939	28.781	640.8	57.20	1509.9	1.273	817.9	0.690
8	0.950	20.778	28.769	637.7	55.99	1474.6	1.248	824.8	0.698
9	0.950	20.562	28.750	635.1	54.59	1440.7	1.223	834.8	0.709
10	0.950	20.274	28.851	633.0	52.79	1412.1	1.204	854.0	0.728
11	0.950	19.891	28.250	631.6	51.58	1368.9	1.168	850.7	0.726
12	0.950	19.652	27.860	631.5	50.92	1346.1	1.148	848.6	0.724
13	0.950	19.381	27.159	632.3	50.56	1315.4	1.120	835.5	0.711

STA 24.000 MASS AVERAGED PROPERTIES

PT= 28.163 TT= 643.26 GAMMA=1.4002 PT-RAT= 1.916 TT-RAT= 1.240

RCU= 0. VM= 801.9 CZ= 800.8 MM=0.674 MABS=0.674 MREL=1.261

EXIT   I=26   STA= 25.000   FREE

WTF= 61.365 OFTX=DPP MTIP=326 AFLOW= 116.27 D+C=0. D+H=0.

OPTY=FREE ITYPE=0 INBR=0 ABC=0. ABH=0.

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-1.270	8.500	0.	0.	693.1	0.	0.	0.566
0.050	-1.270	8.365	0.19	0.0025	718.8	0.	0.	0.590
0.100	-1.270	8.232	0.36	0.0048	735.5	0.	0.	0.606
0.200	-1.270	7.974	0.66	0.0092	775.4	0.	0.	0.644
0.300	-1.270	7.722	0.91	0.0136	799.8	0.	0.	0.668
0.400	-1.270	7.470	1.13	0.0181	816.7	0.	0.	0.686
0.500	-1.270	7.216	1.32	0.0229	824.4	0.	0.	0.696
0.600	-1.270	6.954	1.47	0.0280	827.3	0.	0.	0.700
0.700	-1.270	6.684	1.58	0.0335	831.7	0.	0.	0.706
0.800	-1.270	6.406	1.62	0.0398	843.1	0.	0.	0.718
0.900	-1.270	6.112	1.54	0.0464	828.0	0.	0.	0.705
0.950	-1.270	5.956	1.41	0.0493	817.6	0.	0.	0.695
1.000	-1.270	5.790	0.00	0.1263	798.1	0.	0.	0.676

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.956	21.014	26.109	664.4	65.20	1652.4	1.349	693.1	0.566
2	0.956	21.012	26.581	661.7	64.03	1641.8	1.347	718.8	0.590
3	0.956	21.006	26.910	658.8	63.15	1628.3	1.341	735.5	0.606
4	0.956	20.986	27.731	653.7	61.14	1606.6	1.334	775.4	0.644
5	0.956	20.950	28.269	649.0	59.59	1580.0	1.320	799.8	0.668
6	0.956	20.898	28.639	644.7	58.22	1550.7	1.303	816.7	0.686
7	0.956	20.827	28.781	640.8	57.08	1516.9	1.280	824.4	0.696
8	0.956	20.734	28.769	637.7	56.01	1480.1	1.253	827.3	0.700
9	0.956	20.615	28.750	635.1	54.81	1443.3	1.225	831.7	0.706
10	0.956	20.466	28.851	633.0	53.28	1410.2	1.201	843.1	0.718
11	0.956	20.280	28.250	631.6	52.49	1359.7	1.157	828.0	0.705
12	0.956	20.173	27.860	631.5	52.12	1331.6	1.132	817.6	0.695
13	0.956	19.989	27.159	632.3	52.01	1296.6	1.099	798.1	0.676

STA 25.000 MASS AVERAGED PROPERTIES

PT= 28.163 TT= 643.26 GAMMA=1.4002 PT-RAT= 1.916 TT-RAT= 1.240

RCU= 0. VM= 803.2 CZ= 803.0 MM=0.675 MABS=0.675 MREL=1.264

EXIT

WTF= 61.365

STA= 26.000
I=27   MTIP=339   AFLOW= 116.28
OPTX=DPP   OPTY=FREE   ITYPE=0   INBR=0

D*C=0.   D*H=0.
ABC=0.   ABH=0.

FREE

PSIC	Z	R	PHI	CURV	VM	CU	ALPHAM	MM
0.	-0.350	8.500	0.	0.	711.0	0.	0.	0.581
0.050	-0.350	8.367	0.11	-0.0000	735.8	0.	0.	0.605
0.100	-0.350	8.236	0.21	-0.0000	751.6	0.	0.	0.620
0.200	-0.350	7.981	0.37	-0.0000	789.3	0.	0.	0.656
0.300	-0.350	7.731	0.49	-0.0000	811.0	0.	0.	0.679
0.400	-0.350	7.482	0.57	-0.0000	824.4	0.	0.	0.693
0.500	-0.350	7.229	0.61	-0.0000	827.9	0.	0.	0.699
0.600	-0.350	6.968	0.61	-0.0000	825.4	0.	0.	0.698
0.700	-0.350	6.698	0.54	-0.0000	822.9	0.	0.	0.698
0.800	-0.350	6.418	0.39	-0.0000	825.8	0.	0.	0.702
0.900	-0.350	6.120	0.11	-0.0000	799.3	0.	0.	0.678
0.950	-0.350	5.961	-0.10	-0.0000	781.7	0.	0.	0.662
1.000	-0.350	5.791	0.	0.	748.9	0.	0.	0.631

SL	BLDBLK	PS	PT	TT	BETAM	VREL	MREL	VABS	MABS
1	0.956	20.768	26.109	664.4	64.64	1660.0	1.358	711.0	0.581
2	0.956	20.768	26.581	661.7	63.51	1649.7	1.355	735.8	0.605
3	0.956	20.767	26.910	658.8	62.65	1636.3	1.350	751.6	0.620
4	0.956	20.767	27.731	653.7	60.73	1614.5	1.342	789.3	0.656
5	0.956	20.767	28.269	649.0	59.27	1587.2	1.328	811.0	0.679
6	0.956	20.768	28.639	644.7	58.02	1556.6	1.309	824.4	0.693
7	0.956	20.768	28.781	640.8	57.02	1520.8	1.284	827.9	0.699
8	0.956	20.767	28.769	637.7	56.13	1481.0	1.253	825.4	0.698
9	0.956	20.767	28.750	635.1	55.15	1440.3	1.221	822.9	0.698
10	0.956	20.766	28.851	633.0	53.90	1401.6	1.191	825.8	0.702
11	0.956	20.765	28.250	631.6	53.50	1343.6	1.139	799.3	0.678
12	0.956	20.765	27.860	631.5	53.38	1310.6	1.109	781.7	0.662
13	0.956	20.765	27.159	632.3	53.76	1266.9	1.068	748.9	0.631

STA 26.000 MASS AVERAGED PROPERTIES

PT= 28.163 TT= 643.26 GAMMA=1.4002 PT-RAT= 1.916 TT-RAT= 1.240
RCU= 0.   VM= 801.4 CZ= 801.3 MM=0.673 MABS=0.673 MREL=1.263

Phase I Rotor

BLADE FORCES

THE FORCE CALCULATIONS ARE 'PER BLADE ROW'.
TO FIND THE FORCE ON A SINGLE BLADE, DIVIDE BY 'NB'

THE FORCES ARE THAT OF THE AIR ON THE BLADES.
POSITIVE AXIAL IS AFT; POSITIVE TANGENTIAL IS IN ROTATION DIRECTION.
THE COLUMNS HEADED BY F-TAN*, F-AXL*, AND F-RAD* ARE THE TANGENTIAL,
AXIAL, AND RADIAL FORCES PER INCH OF CHANGE IN R-AVG.

SL	R-AVG (IN.)	H-AVG (IN.)	F-TAN* (LB/IN)	F-AXL* (LB/IN)	F-RAD* (LB/IN)
1	8.500	0.	-300.7	-388.6	6.2
2	8.315	0.185	-303.9	-392.7	4.4
3	8.133	0.367	-308.0	-397.8	-2.4
4	7.770	0.730	-309.9	-394.7	-27.3
5	7.403	1.097	-307.4	-378.7	-42.4
6	7.023	1.477	-309.1	-355.0	-34.5
7	6.623	1.877	-289.1	-323.6	-19.6
8	6.192	2.308	-276.5	-292.6	-13.1
9	5.717	2.783	-264.2	-254.1	-16.2
10	5.181	3.319	-246.5	-207.6	-16.4
11	4.524	3.976	-214.5	-139.5	-17.1
12	4.104	4.396	-187.4	-86.0	-23.7
13	3.551	4.949	-166.8	-47.3	-28.3

NET TORQUE=   -8081.5 IN-LB
NET TAN. FORCE= -1290.7 LB
NET AXIAL FORCE= -1289.8 LB
NET RADIAL FORCE= -99.3 LB

2. STREAMSURFACE BLADE COORDINATES

Figure 30 shows the stacked Phase I rotor streamsurface sections.
Each page of the following tabulation gives the coordinates for one of these
sections. The streamline designation for these sections corresponds to the
calculation streamlines of the circumferential average flow calculation.
Streamline 1 is at the casing and streamline 13 is at the hub. Also given
in the tabulations are coordinates for the section meanline, the meanline
angle, and the section thickness at each point. Streamsurface section chord,
camber angle, and stagger angle are also given. All dimensions in this
tabulation are in inches or degrees.

ROTATION
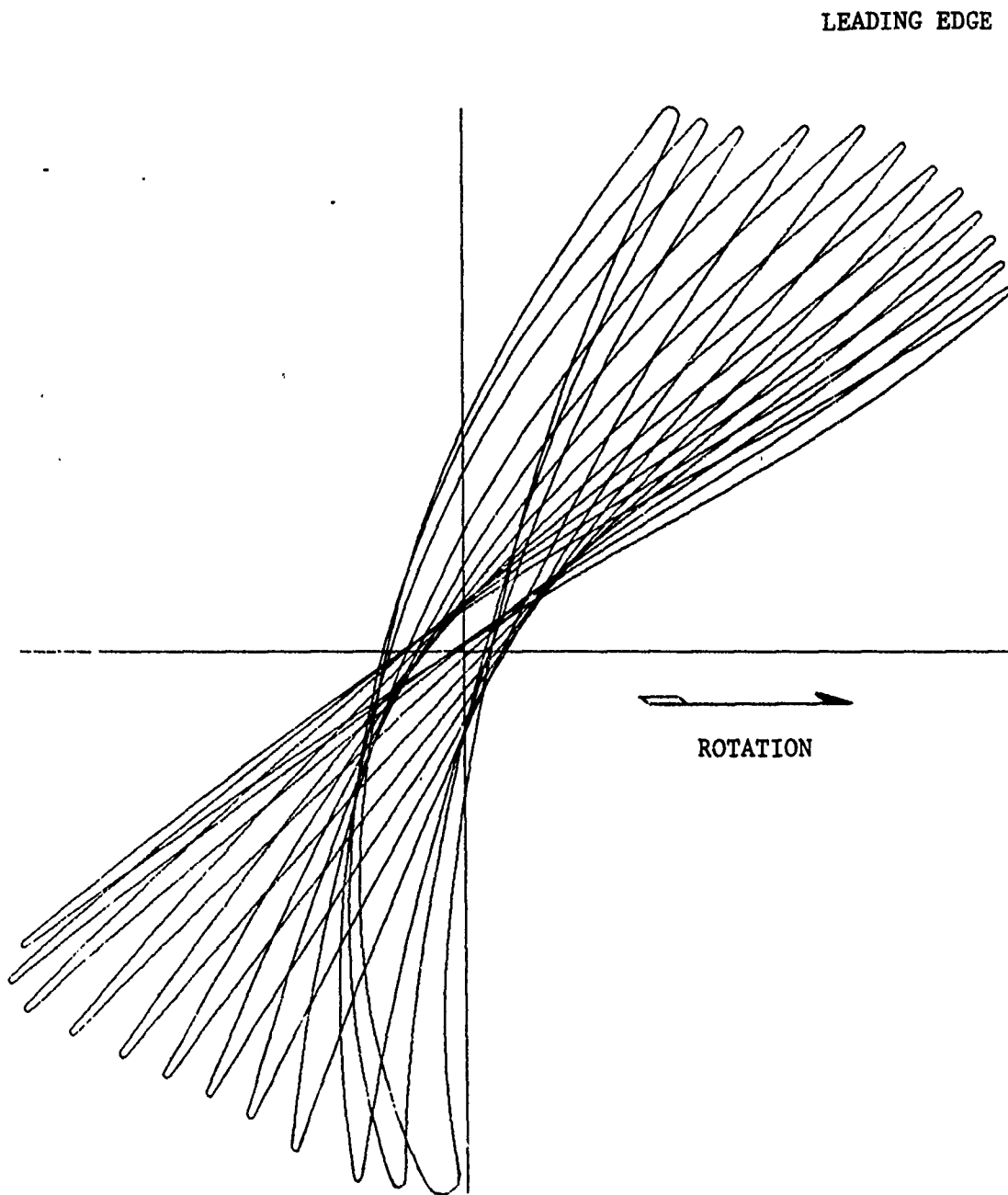
Figure 30. Stacked Phase I Rotor Streamsurface Sections

-------- MEANLINE DATA --------

PT	PCT X	X	Y	B+M	T(M)
1	0.	-1.12890	1.78796	-53.732	0.01809
2	0.02500	-1.07801	1.71757	-54.533	0.02802
3	0.05000	-1.02713	1.64510	-55.314	0.03731
4	0.07500	-0.97624	1.57049	-56.092	0.04591
5	0.10000	-0.92535	1.49365	-56.877	0.05388
6	0.12500	-0.87446	1.41447	-57.664	0.06121
7	0.15000	-0.82358	1.33285	-58.443	0.06784
8	0.17500	-0.77269	1.24874	-59.201	0.07379
9	0.20000	-0.72180	1.16213	-59.920	0.07904
10	0.23000	-0.66074	1.05499	-60.696	0.08441
11	0.26000	-0.59967	0.94469	-61.332	0.08873
12	0.29000	-0.53861	0.83190	-61.762	0.09202
13	0.32000	-0.47754	0.71769	-61.930	0.09431
14	0.35000	-0.41648	0.60328	-61.853	0.09566
15	0.38000	-0.35541	0.48976	-61.556	0.09617
16	0.41000	-0.29435	0.37810	-61.070	0.09593
17	0.44000	-0.23328	0.26900	-60.436	0.09504
18	0.47000	-0.17222	0.16286	-59.731	0.09358
19	0.50000	-0.11115	0.05967	-59.043	0.09160
20	0.53000	-0.05009	-0.04088	-58.427	0.08917
21	0.56000	0.01098	-0.13922	-57.915	0.08634
22	0.59000	0.07204	-0.23581	-57.495	0.08314
23	0.62000	0.13311	-0.33098	-57.139	0.07961
24	0.65000	0.19417	-0.42494	-56.827	0.07578
25	0.68000	0.25524	-0.51783	-56.535	0.07169
26	0.71000	0.31630	-0.60971	-56.244	0.06736
27	0.74000	0.37737	-0.70055	-55.934	0.06282
28	0.77000	0.43843	-0.79032	-55.614	0.05812
29	0.80000	0.49950	-0.87902	-55.297	0.05328
30	0.83000	0.56056	-0.96669	-54.984	0.04833
31	0.86000	0.62163	-1.05335	-54.678	0.04328
32	0.89000	0.68269	-1.13904	-54.370	0.03816
33	0.92000	0.74376	-1.22375	-54.055	0.03300
34	0.95000	0.80483	-1.30747	-53.730	0.02783
35	0.97500	0.85571	-1.37648	-53.454	0.02353
36	1.00000	0.90660	-1.44478	-53.173	0.01923

-------- SURFACE COORDINATES --------

PT	XS	YS	XP	YP
1	-1.12890	1.78796	-1.12890	1.78796
2	-1.13274	1.78152	-1.12139	1.78964
3	-1.13130	1.77503	-1.11584	1.78633
4	-1.08942	1.70944	-1.06660	1.72570
5	-1.04247	1.63348	-1.01178	1.65571
6	-0.99529	1.55768	-0.95718	1.58330
7	-0.94791	1.47893	-0.90279	1.50837
8	-0.90032	1.39810	-0.84861	1.43084
9	-0.85248	1.31510	-0.79467	1.35061
10	-0.80438	1.22985	-0.74100	1.27063
11	-0.75600	1.14232	-0.68760	1.18193
12	-0.69754	1.03433	-0.62393	1.07564
13	-0.63860	0.92340	-0.56074	0.96597
14	-0.57914	0.81013	-0.49807	0.85367
15	-0.51915	0.69551	-0.43593	0.73988
16	-0.45865	0.58071	-0.37430	0.62584
17	-0.39769	0.46686	-0.31313	0.51266
18	-0.33632	0.35489	-0.25237	0.40130
19	-0.27461	0.24555	-0.19195	0.29244
20	-0.21263	0.13927	-0.13180	0.18644
21	-0.15043	0.03611	-0.07187	0.08323
22	-0.08807	-0.06422	-0.01210	-0.01753
23	-0.02559	-0.16215	0.04755	-0.11629
24	0.03699	-0.25815	0.10710	-0.21347
25	0.09967	-0.35258	0.16655	-0.30938
26	0.16246	-0.44567	0.22589	-0.40421
27	0.22534	-0.53760	0.28514	-0.49807
28	0.28830	-0.62842	0.34431	-0.59100
29	0.35135	-0.71815	0.40339	-0.68296
30	0.41445	-0.80673	0.46242	-0.77391
31	0.47760	-0.89419	0.52140	-0.86386
32	0.54077	-0.98056	0.58036	-0.95282
33	0.60397	-1.06587	0.63929	-1.04084
34	0.66719	-1.15016	0.69820	-1.12793
35	0.73040	-1.23344	0.75712	-1.21407
36	0.79361	-1.31570	0.81604	-1.29924
37	0.84626	-1.38348	0.86516	-1.36947
38	0.89295	-1.44299	0.90873	-1.43119
39	0.89881	-1.44657	0.91050	-1.43790
40	0.90660	-1.44478	0.90660	-1.44478

CHORD 3.82020   CAMBER 0.559   STAGGER -57.803

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 3

NB 20

-------- MEANLINE DATA --------

PT	PCT X	X	Y	B*M	T(M)
1	0.	-1.20533	1.76078	-52.407	0.01878
2	0.02500	-1.14976	1.68756	-53.197	0.02871
3	0.05000	-1.09420	1.61223	-53.970	0.03808
4	0.07500	-1.03863	1.53474	-54.741	0.04679
5	0.10000	-0.98306	1.45500	-55.519	0.05489
6	0.12500	-0.92750	1.37290	-56.296	0.06235
7	0.15000	-0.87193	1.28837	-57.057	0.06916
8	0.17500	-0.81636	1.20141	-57.779	0.07531
9	0.20000	-0.76080	1.11208	-58.436	0.08078
10	0.23000	-0.69412	1.00205	-59.104	0.08641
11	0.26000	-0.62744	0.88945	-59.597	0.09099
12	0.29000	-0.56076	0.77513	-59.850	0.09454
13	0.32000	-0.49408	0.66031	-59.813	0.09707
14	0.35000	-0.42740	0.54627	-59.516	0.09866
15	0.38000	-0.36072	0.43407	-59.004	0.09937
16	0.41000	-0.29404	0.32449	-58.332	0.09930
17	0.44000	-0.22736	0.21796	-57.569	0.09854
18	0.47000	-0.16068	0.11457	-56.799	0.09718
19	0.50000	-0.09400	0.01402	-56.116	0.09530
20	0.53000	-0.02732	-0.08421	-55.565	0.09292
21	0.56000	0.03936	-0.18069	-55.163	0.09010
22	0.59000	0.10604	-0.27595	-54.866	0.08688
23	0.62000	0.17272	-0.37026	-54.614	0.08330
24	0.65000	0.23940	-0.46375	-54.391	0.07938
25	0.68000	0.30608	-0.55650	-54.187	0.07515
26	0.71000	0.37276	-0.64859	-53.997	0.07065
27	0.74000	0.43944	-0.74004	-53.808	0.06591
28	0.77000	0.50612	-0.83083	-53.599	0.06096
29	0.80000	0.57280	-0.92086	-53.343	0.05584
30	0.83000	0.63948	-1.00996	-53.024	0.05058
31	0.85000	0.70616	-1.09791	-52.624	0.04522
32	0.89000	0.77284	-1.18445	-52.129	0.03980
33	0.92000	0.83952	-1.26930	-51.529	0.03435
34	0.95000	0.90620	-1.35221	-50.835	0.02892
35	0.97500	0.96177	-1.41967	-50.199	0.02444
36	1.00000	1.01734	-1.48557	-49.526	0.01999

-------- SURFACE COORDINATES --------

PT	XS	YS	XP	YP
1	-1.20533	1.76078	-1.20533	1.76078
2	-1.20915	1.75401	-1.19759	1.76269
3	-1.20748	1.74732	-1.19176	1.75938
4	-1.16126	1.67896	-1.13827	1.69616
5	-1.10959	1.60104	-1.07880	1.62343
6	-1.05773	1.52124	-1.01953	1.54825
7	-1.00569	1.43946	-0.96044	1.47054
8	-0.95343	1.35560	-0.90156	1.39020
9	-0.90095	1.26957	-0.84291	1.30718
10	-0.84822	1.18133	-0.78451	1.22148
11	-0.79521	1.09094	-0.72638	1.13322
12	-0.73119	0.97987	-0.65704	1.02424
13	-0.66668	0.86642	-0.58820	0.91247
14	-0.60163	0.75138	-0.51988	0.79887
15	-0.53603	0.63590	-0.45212	0.68471
16	-0.46991	0.52124	-0.38488	0.57129
17	-0.40331	0.40848	-0.31812	0.45966
18	-0.33629	0.29842	-0.25178	0.35056
19	-0.26894	0.19154	-0.18577	0.24438
20	-0.20134	0.08796	-0.12002	0.1411.7
21	-0.13355	-0.01255	-0.05444	0.04058
22	-0.06564	-0.11048	0.01100	-0.05793
23	0.00239	-0.20643	0.07634	-0.15496
24	0.07052	-0.30095	0.14157	-0.25096
25	0.13877	-0.39438	0.20668	-0.34614
26	0.20714	-0.48686	0.27167	-0.44064
27	0.27561	-0.57849	0.33656	-0.53451
28	0.34419	-0.66935	0.40134	-0.62782
29	0.41285	-0.75950	0.46604	-0.72058
30	0.48159	-0.84892	0.53066	-0.81274
31	0.55041	-0.93753	0.59520	-0.90420
32	0.61928	-1.02517	0.65969	-0.99475
33	0.68820	-1.11164	0.72413	-1.08419
34	0.75714	-1.19667	0.78855	-1.17224
35	0.82608	-1.27999	0.85297	-1.25862
36	0.89500	-1.36134	0.91741	-1.34308
37	0.95238	-1.42749	0.97116	-1.41185
38	1.00305	-1.48462	1.01866	-1.47133
39	1.00932	-1.48793	1.02093	-1.47824
40	1.01734	-1.48557	1.01734	-1.48557

CHORD 3.93435   CAMBER 2.882   STAGGER -55.602

PHASE I ROTOR

MERIDIONAL AIRFOIL GEOMETRY. - STREAMLINE 4

NB 20

		MEANLINE DATA					SURFACE COORDINATES			
PT	PCT X	X	Y	B+M	T(M)	PT	XS	YS	XP	YP
1	0.	-1.28523	1.73396	-51.014	0.01937	1	-1.28523	1.73396	-1.28523	1.73396
2	0.02500	-1.22544	1.65910	-51.752	0.03019	2	-1.28900	1.72686	-1.27729	1.73613
3	0.05000	-1.16565	1.58226	-52.472	0.04041	3	-1.28713	1.72000	-1.27118	1.73287
4	0.07500	-1.10587	1.50341	-53.185	0.04995	4	-1.23730	1.64976	-1.21359	1.66845
5	0.10000	-1.04608	1.42249	-53.895	0.05884	5	-1.18168	1.56995	-1.14963	1.59457
6	0.12500	-0.98629	1.33945	-54.594	0.06707	6	-1.12586	1.48844	-1.08587	1.51838
7	0.15000	-0.92651	1.25427	-55.270	0.07463	7	-1.06985	1.40515	-1.02231	1.43983
8	0.17500	-0.86672	1.16699	-55.900	0.08148	8	-1.01363	1.32002	-0.95896	1.35888
9	0.20000	-0.80693	1.07772	-56.463	0.08760	9	-0.95717	1.23301	-0.89584	1.27553
10	0.23000	-0.73519	0.96828	-57.016	0.09397	10	-0.90045	1.14415	-0.83299	1.18983
11	0.26000	-0.66345	0.85685	-57.395	0.09923	11	-0.84344	1.05352	-0.77042	1.10192
12	0.29000	-0.59170	0.74429	-57.538	0.10338	12	-0.77460	0.94270	-0.69578	0.99385
13	0.32000	-0.51996	0.63172	-57.394	0.10643	13	-0.70524	0.83012	-0.62165	0.88359
14	0.35000	-0.44821	0.52035	-56.985	0.10844	14	-0.63531	0.71654	-0.54809	0.77203
15	0.38000	-0.37647	0.41118	-56.352	0.10947	15	-0.56479	0.60304	-0.47513	0.66039
16	0.41000	-0.30473	0.30497	-55.545	0.10960	16	-0.49368	0.49081	-0.40275	0.54989
17	0.44000	-0.23298	0.20214	-54.635	0.10893	17	-0.42203	0.38086	-0.33091	0.44151
18	0.47000	-0.16124	0.10274	-53.738	0.10756	18	-0.34991	0.27397	-0.25954	0.33598
19	0.50000	-0.08949	0.00633	-52.982	0.10557	19	-0.27740	0.17062	-0.18856	0.23367
20	0.53000	-0.01775	-0.08780	-52.423	0.10301	20	-0.20460	0.07093	-0.11787	0.13455
21	0.56000	0.05399	-0.18041	-52.074	0.09994	21	-0.13164	-0.02545	-0.04735	0.03810
22	0.59000	0.12574	-0.27209	-51.846	0.09639	22	-0.05857	-0.11921	0.02307	-0.05639
23	0.62000	0.19748	-0.36307	-51.639	0.09239	23	0.01458	-0.21112	0.09341	-0.14969
24	0.65000	0.26923	-0.45337	-51.428	0.08800	24	0.08784	-0.30186	0.16364	-0.24231
25	0.68000	0.34097	-0.54298	-51.206	0.08325	25	0.16126	-0.39174	0.23371	-0.33440
26	0.71000	0.41272	-0.63186	-50.971	0.07818	26	0.23483	-0.48081	0.30363	-0.42594
27	0.74000	0.48446	-0.71998	-50.720	0.07282	27	0.30853	-0.56906	0.37341	-0.51690
28	0.77000	0.55620	-0.80727	-50.445	0.06722	28	0.38235	-0.65648	0.44308	-0.60725
29	0.80000	0.62795	-0.89367	-50.137	0.06143	29	0.45628	-0.74303	0.51264	-0.69692
30	0.83050	0.69969	-0.97906	-49.781	0.05546	30	0.53029	-0.82868	0.58212	-0.78587
31	0.86000	0.77144	-1.06329	-49.360	0.04938	31	0.60437	-0.91336	0.65152	-0.87399
32	0.89000	0.84318	-1.14616	-48.847	0.04322	32	0.67852	-0.99697	0.72087	-0.96116
33	0.92000	0.91492	-1.22737	-48.219	0.03702	33	0.75270	-1.07938	0.79017	-1.04721
34	0.95000	0.98667	-1.30666	-47.484	0.03084	34	0.82691	-1.16038	0.85945	-1.13193
35	0.97500	1.04645	-1.37111	-46.807	0.02573	35	0.90112	-1.23971	0.92873	-1.21504
36	1.00000	1.10624	-1.43401	-46.089	0.02064	36	0.97530	-1.31708	0.99803	-1.29624
						37	1.03708	-1.37992	1.05583	-1.36231
						38	1.09143	-1.43393	1.10675	-1.41923
						39	1.09810	-1.43695	1.10950	-1.42622
						40	1.10624	-1.43401	1.10624	-1.43401

CHORD 3.96927   CAMBER 4.925   STAGGER -52.951

46

PHASE I ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 5

| | | MEANLINE DATA | | | | | SURFACE COORDINATES | | | |
PT	PCT X	X	Y	B+M	T(M)	PT	XS	YS	XP	YP
1	0.	-1.36095	1.68911	-49.624	0.01959	1	-1.36095	1.68911	-1.36095	1.68911
2	0.02500	-1.29738	1.61343	-50.313	0.03215	2	-1.36462	1.68182	-1.35296	1.69152
3	0.05000	-1.23382	1.53591	-50.976	0.04403	3	-1.36258	1.67491	-1.34667	1.68841
4	0.07500	-1.17025	1.45658	-51.609	0.05517	4	-1.30975	1.60317	-1.28501	1.62370
5	0.10000	-1.10668	1.37547	-52.208	0.06561	5	-1.25092	1.52205	-1.21671	1.54978
6	0.12500	-1.04312	1.29265	-52.768	0.07530	6	-1.19187	1.43945	-1.14863	1.47371
7	0.15000	-0.97955	1.20821	-53.282	0.08420	7	-1.13261	1.35537	-1.08076	1.39557
8	0.17500	-0.91598	1.12224	-53.752	0.09227	8	-1.07309	1.26987	-1.01314	1.31544
9	0.20000	-0.85242	1.03485	-54.174	0.09952	9	-1.01329	1.18304	-0.94580	1.23338
10	0.23000	-0.77614	0.92835	-54.580	0.10709	10	-0.95319	1.09496	-0.87878	1.14952
11	0.26000	-0.69985	0.82055	-54.813	0.11342	11	-0.89276	1.00572	-0.81207	1.06397
12	0.29000	-0.62357	0.71236	-54.757	0.11847	12	-0.81977	0.89731	-0.73250	0.95938
13	0.32000	-0.54729	0.60515	-54.313	0.12224	13	-0.74620	0.78787	-0.65351	0.85323
14	0.35000	-0.47101	0.50035	-53.541	0.12479	14	-0.67195	0.67818	-0.57520	0.74654
15	0.38000	-0.39473	0.39890	-52.548	0.12618	15	-0.59694	0.56950	-0.49765	0.64081
16	0.41000	-0.31845	0.30193	-51.468	0.12651	16	-0.52120	0.46327	-0.42083	0.53743
17	0.44000	-0.24217	0.20720	-50.442	0.12589	17	-0.44482	0.36054	-0.34465	0.43727
18	0.47000	-0.16589	0.11636	-49.535	0.12442	18	-0.36794	0.26182	-0.26897	0.34063
19	0.50000	-0.08961	0.02815	-48.788	0.12218	19	-0.29070	0.16711	-0.19364	0.24729
20	0.53000	-0.01333	-0.05803	-48.213	0.11925	20	-0.21322	0.07599	-0.11856	0.15674
21	0.56000	0.06295	-0.14273	-47.802	0.11569	21	-0.13557	-0.01210	-0.04366	0.06840
22	0.59000	0.13923	-0.22639	-47.492	0.11155	22	-0.05779	-0.09776	0.03113	-0.01829
23	0.62000	0.21551	-0.30921	-47.217	0.10687	23	0.02009	-0.18159	0.10580	-0.10388
24	0.65000	0.29179	-0.39126	-46.956	0.10170	24	0.09811	-0.26408	0.18034	-0.18871
25	0.68000	0.36807	-0.47257	-46.702	0.09611	25	0.17629	-0.34550	0.25472	-0.27292
26	0.71000	0.44435	-0.55317	-46.450	0.09012	26	0.25462	-0.42597	0.32895	-0.35655
27	0.74000	0.52063	-0.63305	-46.197	0.08378	27	0.33309	-0.50552	0.40304	-0.43961
28	0.77000	0.59691	-0.71223	-45.932	0.07712	28	0.41169	-0.58421	0.47701	-0.52212
29	0.80000	0.67319	-0.79064	-45.644	0.07021	29	0.49040	-0.66205	0.55086	-0.60406
30	0.83000	0.74947	-0.86823	-45.323	0.06309	30	0.56920	-0.73905	0.62462	-0.68541
31	0.86000	0.82575	-0.94489	-44.955	0.05580	31	0.64809	-0.81519	0.69829	-0.76610
32	0.89000	0.90203	-1.02050	-44.526	0.04838	32	0.72704	-0.89041	0.77190	-0.84605
33	0.92000	0.97831	-1.09489	-44.024	0.04088	33	0.80604	-0.96464	0.84546	-0.92515
34	0.95000	1.05459	-1.16791	-43.457	0.03336	34	0.88507	-1.03775	0.91900	-1.00326
35	0.97500	1.11816	-1.22761	-42.945	0.02712	35	0.96410	-1.10959	0.99252	-1.08020
36	1.00000	1.18173	-1.28622	-42.410	0.02089	36	1.04312	-1.18002	1.06607	-1.15580
						37	1.10892	-1.23753	1.12740	-1.21768
						38	1.16672	-1.28716	1.18133	-1.27121
						39	1.17371	-1.28974	1.18453	-1.27810
						40	1.18173	-1.28622	1.18173	-1.28622

CHORD 3.91380 CAMBER 7.214 STAGGER -49.483

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PHASE I ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 6

PT	PCT X	X	Y	B+M	T(M)		PT	XS	YS	XP	YP
1	0.	-1.43240	1.62617	-48.221	0.01963		1	-1.43240	1.62617	-1.43240	1.62617
2	0.02500	-1.36534	1.55039	-48.761	0.03479		2	-1.43593	1.61872	-1.42445	1.62882
3	0.05000	-1.29829	1.47319	-49.279	0.04922		3	-1.43377	1.61184	-1.41800	1.62590
4	0.07500	-1.23123	1.39460	-49.768	0.06282		4	-1.37842	1.53893	-1.35226	1.56186
5	0.10000	-1.16417	1.31469	-50.219	0.07560		5	-1.31694	1.45714	-1.27963	1.48925
6	0.12500	-1.09711	1.23356	-50.623	0.08754		6	-1.25521	1.37432	-1.20726	1.41489
7	0.15000	-1.03006	1.15133	-50.975	0.09855		7	-1.19322	1.29051	-1.13512	1.33888
8	0.17500	-0.96300	1.06814	-51.272	0.10862		8	-1.13095	1.20579	-1.06328	1.26133
9	0.20000	-0.89594	0.98415	-51.508	0.11773		9	-1.06834	1.12030	-0.99177	1.18235
10	0.23000	-0.81547	0.88261	-51.676	0.12735		10	-1.00537	1.03416	-0.92063	1.10217
11	0.26000	-0.73500	0.78076	-51.656	0.13549		11	-0.94201	0.94751	-0.84987	1.02079
12	0.29000	-0.65453	0.67952	-51.327	0.14211		12	-0.86542	0.84312	-0.76552	0.92209
13	0.32000	-0.57406	0.58018	-50.586	0.14718		13	-0.78813	0.73874	-0.68187	0.82279
14	0.35000	-0.49359	0.48402	-49.519	0.15076		14	-0.71000	0.63512	-0.59906	0.72392
15	0.38000	-0.41312	0.39175	-48.275	0.15290		15	-0.63092	0.53345	-0.51721	0.62690
16	0.41000	-0.33265	0.30347	-47.044	0.15370		16	-0.55093	0.43508	-0.43626	0.53296
17	0.44000	-0.25218	0.21865	-46.005	0.15328		17	-0.47018	0.34087	-0.35606	0.44263
18	0.47000	-0.17172	0.13655	-45.168	0.15173		18	-0.38890	0.25110	-0.27641	0.35584
19	0.50000	-0.09125	0.05659	-44.490	0.14918		19	-0.30732	0.16542	-0.19705	0.27188
20	0.53000	-0.01078	-0.02168	-43.942	0.14572		20	-0.22552	0.08307	-0.11791	0.19004
21	0.56000	0.06369	-0.09861	-43.500	0.14141		21	-0.14352	0.00338	-0.03897	0.10981
22	0.59000	0.15016	-0.17447	-43.126	0.13632		22	-0.06134	-0.07414	0.03978	0.03078
23	0.62000	0.23063	-0.24939	-42.787	0.13052		23	0.02102	-0.14990	0.11836	-0.04733
24	0.65000	0.31110	-0.32345	-42.465	0.12408		24	0.10357	-0.22421	0.19676	-0.12472
25	0.68000	0.39157	-0.39669	-42.146	0.11705		25	0.18630	-0.29728	0.27496	-0.20150
26	0.71000	0.47204	-0.46910	-41.822	0.10951		26	0.26922	-0.36921	0.35299	-0.27768
27	0.74000	0.55251	-0.54069	-41.488	0.10149		27	0.35230	-0.44008	0.43084	-0.35329
28	0.77000	0.63298	-0.61142	-41.143	0.09307		28	0.43553	-0.50990	0.50855	-0.42830
29	0.80000	0.71345	-0.68130	-40.792	0.08431		29	0.51889	-0.57870	0.58612	-0.50268
30	0.83000	0.79392	-0.75030	-40.435	0.07527		30	0.60236	-0.64647	0.66359	-0.57638
31	0.86000	0.87439	-0.81844	-40.076	0.06600		31	0.68591	-0.71321	0.74099	-0.64938
32	0.89000	0.95486	-0.88571	-39.720	0.05653		32	0.76951	-0.77895	0.81333	-0.72165
33	0.92000	1.03533	-0.95215	-39.370	0.04692		33	0.85314	-0.84369	0.89563	-0.79318
34	0.95000	1.11579	-1.01777	-39.024	0.03724		34	0.93679	-0.90745	0.97292	-0.86397
35	0.97500	1.18285	-1.07185	-38.738	0.02915		35	1.02044	-0.97029	1.05021	-0.93401
36	1.00000	1.24991	-1.12537	-38.451	0.02105		36	1.10407	-1.03224	1.12752	-1.00331
							37	1.17373	-1.08321	1.19197	-1.06048
							38	1.23482	-1.12746	1.24854	-1.11020
							39	1.24210	-1.12951	1.25219	-1.11692
							40	1.24991	-1.12537	1.24991	-1.12537

CHORD 3.84262   CAMBER 9.770   STAGGER -45.730

PHASE I ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 7

------------------ MEANLINE DATA ------------------						------------------ SURFACE COORDINATES ------------------				
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP
1	0.	-1.50326	1.54405	-46.856	0.01923	1	-1.50326	1.54405	-1.50326	1.54405
2	0.02500	-1.43286	1.46838	-47.267	0.03757	2	-1.50659	1.53661	-1.49551	1.54688
3	0.05000	-1.36245	1.39164	-47.661	0.05514	3	-1.50437	1.52989	-1.48906	1.54422
4	0.07500	-1.29205	1.31386	-48.032	0.07182	4	-1.44665	1.45563	-1.41906	1.48113
5	0.10000	-1.22164	1.23510	-48.371	0.08761	5	-1.38283	1.37307	-1.34207	1.41021
6	0.12500	-1.15124	1.15547	-48.659	0.10245	6	-1.31875	1.28985	-1.26535	1.33787
7	0.15000	-1.08083	1.07512	-48.874	0.11628	7	-1.25438	1.20600	-1.18890	1.26420
8	0.17500	-1.01043	0.99431	-48.975	0.12901	8	-1.18970	1.12163	-1.11277	1.18931
9	0.20000	-0.94002	0.91343	-48.923	0.14060	9	-1.12462	1.03688	-1.03704	1.11336
10	0.23000	-0.85553	0.81691	-48.642	0.15291	10	-1.05909	0.95197	-0.96176	1.03665
11	0.26000	-0.77105	0.72175	-48.111	0.16341	11	-0.99301	0.86724	-0.88703	0.95962
12	0.29000	-0.68656	0.62877	-47.333	0.17208	12	-0.91297	0.76639	-0.79815	0.86742
13	0.32000	-0.60208	0.53864	-46.330	0.17891	13	-0.83187	0.66720	-0.71022	0.77631
14	0.35000	-0.51759	0.45187	-45.178	0.18394	14	-0.74983	0.57045	-0.62330	0.68708
15	0.38000	-0.43310	0.36861	-43.981	0.18723	15	-0.66678	0.47687	-0.53737	0.60041
16	0.41000	-0.34862	0.28870	-42.855	0.18885	16	-0.58282	0.38704	-0.45236	0.51670
17	0.44000	-0.26413	0.21165	-41.898	0.18887	17	-0.49811	0.30125	-0.36809	0.43598
18	0.47000	-0.17965	0.13694	-41.089	0.18740	18	-0.41284	0.21947	-0.28440	0.35792
19	0.50000	-0.09516	0.06421	-40.374	0.18456	19	-0.32720	0.14136	-0.20107	0.28194
20	0.53000	-0.01067	-0.00680	-39.727	0.18045	20	-0.24123	0.06632	-0.11806	0.20756
21	0.56000	0.07381	-0.07626	-39.130	0.17522	21	-0.15494	-0.00609	-0.03538	0.13451
22	0.59000	0.15830	-0.14432	-38.584	0.16894	22	-0.06834	-0.07620	0.04699	0.06259
23	0.62000	0.24279	-0.21112	-38.090	0.16172	23	0.01852	-0.14422	0.12910	-0.00830
24	0.65000	0.32727	-0.27680	-37.645	0.15362	24	0.10562	-0.21035	0.21098	-0.07829
25	0.68000	0.41176	-0.34149	-37.243	0.14476	25	0.19290	-0.27476	0.29267	-0.14748
26	0.71000	0.49624	-0.40529	-36.879	0.13519	26	0.28036	-0.33763	0.37418	-0.21598
27	0.74000	0.58073	-0.46829	-36.543	0.12499	27	0.36795	-0.39911	0.45556	-0.28387
28	0.77000	0.66522	-0.53053	-36.216	0.11424	28	0.45568	-0.45936	0.53681	-0.35122
29	0.80000	0.74970	-0.59202	-35.877	0.10301	29	0.54352	-0.51850	0.61794	-0.41808
30	0.83000	0.83419	-0.65273	-35.520	0.09137	30	0.63147	-0.57662	0.69896	-0.48445
31	0.86000	0.91867	-0.71263	-35.149	0.07940	31	0.71952	-0.63376	0.77989	-0.55029
32	0.89000	1.00316	-0.77171	-34.782	0.06718	32	0.80765	-0.68992	0.86073	-0.61555
33	0.92000	1.08765	-0.83001	-34.438	0.05475	33	0.89582	-0.74509	0.94153	-0.68017
34	0.95000	1.17213	-0.88759	-34.116	0.04220	34	0.98400	-0.79930	1.02232	-0.74412
35	0.97500	1.24254	-0.93506	-33.858	0.03169	35	1.07216	-0.85259	1.10313	-0.80743
36	1.00000	1.31294	-0.98206	-33.604	0.02116	36	1.16030	-0.90506	1.18397	-0.87012
						37	1.23371	-0.94821	1.25137	-0.92190
						38	1.29793	-0.98557	1.31037	-0.96687
						39	1.30544	-0.98693	1.31455	-0.97335
						40	1.31294	-0.98206	1.31294	-0.98206

CHORD   3.78315   CAMBER   13.252   STAGGER   -41.892

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PHASE I ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 8

NB 20

	----- MEANLINE DATA -----						----- SURFACE COORDINATES -----		
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP
1	0.	-1.57268	1.44253	-45.585	0.01841	1	-1.57268	1.44253	-1.57268	1.44253
2	0.02500	-1.49905	1.36700	-45.874	0.03920	2	-1.57574	1.43530	-1.56532	1.44543
3	0.05000	-1.42542	1.29073	-46.140	0.05926	3	-1.57351	1.42891	-1.55904	1.44307
4	0.07500	-1.35180	1.21380	-46.362	0.07848	4	-1.51312	1.35335	-1.48498	1.38064
5	0.10000	-1.27817	1.13635	-46.521	0.09687	5	-1.44679	1.27019	-1.40406	1.31176
6	0.12500	-1.20454	1.05859	-46.593	0.11432	6	-1.38020	1.18672	-1.32340	1.24088
7	0.15000	-1.13091	0.98077	-46.548	0.13072	7	-1.31331	1.10303	-1.24302	1.16968
8	0.17500	-1.05728	0.90330	-46.337	0.14597	8	-1.24606	1.01931	-1.16301	1.09786
9	0.20000	-0.98365	0.82667	-45.912	0.15996	9	-1.17836	0.93582	-1.08346	1.02573
10	0.23000	-0.89530	0.73662	-45.124	0.17496	10	-1.11008	0.85291	-1.00448	0.95369
11	0.26000	-0.80694	0.64945	-44.063	0.18791	11	-1.04110	0.77103	-0.92621	0.88232
12	0.29000	-0.71859	0.56572	-42.843	0.19877	12	-0.95729	0.67490	-0.83331	0.79835
13	0.32000	-0.63023	0.48554	-41.596	0.20758	13	-0.87228	0.58194	-0.74160	0.71696
14	0.35000	-0.54188	0.40877	-40.390	0.21438	14	-0.78617	0.49284	-0.65101	0.63859
15	0.38000	-0.45353	0.33509	-39.279	0.21920	15	-0.69914	0.40792	-0.56133	0.56316
16	0.41000	-0.36517	0.26410	-38.304	0.22207	16	-0.61134	0.32713	-0.47242	0.49041
17	0.44000	-0.27682	0.19536	-37.487	0.22298	17	-0.52291	0.25025	-0.38414	0.41993
18	0.47000	-0.18846	0.12847	-36.778	0.22201	18	-0.43399	0.17697	-0.29635	0.35173
19	0.50000	-0.10011	0.06322	-36.115	0.21923	19	-0.34467	0.10689	-0.20897	0.28382
20	0.53000	-0.01175	-0.00048	-35.465	0.21481	20	-0.25492	0.03956	-0.12200	0.21738
21	0.56000	0.07660	-0.06266	-34.811	0.20890	21	-0.16472	-0.02533	-0.03550	0.15177
22	0.59000	0.16496	-0.12336	-34.165	0.20162	22	-0.07407	-0.08796	0.05056	0.08700
23	0.62000	0.25331	-0.18263	-33.544	0.19309	23	0.01697	-0.14842	0.13623	0.02309
24	0.65000	0.34167	-0.24055	-32.954	0.18342	24	0.10834	-0.20677	0.22157	-0.03995
25	0.68000	0.43002	-0.29721	-32.398	0.17275	25	0.19996	-0.26309	0.30666	-0.10216
26	0.71000	0.51837	-0.35271	-31.880	0.16116	26	0.29178	-0.31750	0.39155	-0.16359
27	0.74000	0.60673	-0.40715	-31.399	0.14877	27	0.38374	-0.37014	0.47630	-0.22428
28	0.77000	0.69508	-0.46060	-30.946	0.13566	28	0.47582	-0.42114	0.56093	-0.28429
29	0.80000	0.78344	-0.51311	-30.508	0.12192	29	0.56797	-0.47064	0.64548	-0.34366
30	0.83000	0.87179	-0.56473	-30.081	0.10767	30	0.66020	-0.51877	0.72996	-0.40242
31	0.86000	0.96015	-0.61548	-29.666	0.09298	31	0.75249	-0.56563	0.81439	-0.46059
32	0.89000	1.04850	-0.66540	-29.269	0.07795	32	0.84481	-0.61131	0.89878	-0.51815
33	0.92000	1.13686	-0.71454	-28.896	0.06264	33	0.93714	-0.65588	0.98316	-0.57508
34	0.95000	1.22521	-0.76294	-28.543	0.04715	34	1.02945	-0.69940	1.06756	-0.63140
35	0.97500	1.29884	-0.80276	-28.259	0.03417	35	1.12172	-0.74196	1.15199	-0.69711
36	1.00000	1.37247	-0.84210	-27.978	0.02116	36	1.21395	-0.78366	1.23648	-0.74223
						37	1.29075	-0.81781	1.30693	-0.78771
						38	1.35780	-0.84722	1.36851	-0.82709
						39	1.36544	-0.84775	1.37325	-0.83322
						40	1.37247	-0.84210	1.37247	0.84210

CHORD 3.72739   CAMBER 17.607   STAGGER -37.802

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 9

------- MEANLINE DATA -------

PT	PCT X	X	Y	B*M	T(M)
1	0.	-1.62751	1.30702	-44.404	0.01815
2	0.02500	-1.55076	1.23175	-44.482	0.04013
3	0.05000	-1.47402	1.15632	-44.519	0.06166
4	0.07500	-1.39728	1.08090	-44.467	0.08259
5	0.10000	-1.32053	1.00578	-44.283	0.10233
6	0.12500	-1.24379	0.93134	-43.943	0.12222
7	0.15000	-1.16704	0.85799	-43.430	0.14061
8	0.17500	-1.09030	0.78617	-42.749	0.15787
9	0.20000	-1.01356	0.71623	-41.911	0.17390
10	0.23000	-0.92146	0.63522	-40.727	0.19136
11	0.26000	-0.82937	0.55774	-39.405	0.20679
12	0.29000	-0.73728	0.48388	-38.057	0.22012
13	0.32000	-0.64518	0.41342	-36.798	0.23131
14	0.35000	-0.55309	0.34597	-35.662	0.24037
15	0.38000	-0.46100	0.28113	-34.654	0.24726
16	0.41000	-0.36890	0.21855	-33.758	0.25193
17	0.44000	-0.27681	0.15794	-32.949	0.25434
18	0.47000	-0.18472	0.09912	-32.190	0.25445
19	0.50000	-0.09263	0.04198	-31.446	0.25228
20	0.53000	-0.00053	-0.01352	-30.698	0.24800
21	0.56000	0.09156	-0.06737	-29.939	0.24180
22	0.59000	0.18365	-0.11961	-29.188	0.23385
23	0.62000	0.27575	-0.17029	-28.467	0.22431
24	0.65000	0.36784	-0.21951	-27.780	0.21331
25	0.68000	0.45993	-0.26735	-27.127	0.20101
26	0.71000	0.55202	-0.31389	-26.502	0.18753
27	0.74000	0.64412	-0.35921	-25.904	0.17302
28	0.77000	0.73621	-0.40336	-25.328	0.15759
29	0.80000	0.82830	-0.44640	-24.773	0.14135
30	0.83000	0.92040	-0.48838	-24.236	0.12442
31	0.86000	1.01249	-0.52933	-23.717	0.10692
32	0.89000	1.10458	-0.56931	-23.217	0.08898
33	0.92000	1.19667	-0.60835	-22.737	0.07069
34	0.95000	1.28877	-0.64651	-22.270	0.05218
35	0.97500	1.36551	-0.67764	-21.887	0.03666
36	1.00000	1.44226	-0.70817	-21.506	0.02111

------- SURFACE COORDINATES -------

PT	XS	YS	XP	YP
1	-1.62751	1.30702	-1.62751	1.30702
2	-1.63038	1.29980	-1.62033	1.31004
3	-1.62806	1.29356	-1.61405	1.30786
4	-1.56482	1.21744	-1.53670	1.24607
5	-1.49564	1.13434	-1.45240	1.17830
6	-1.42620	1.05143	-1.36835	1.11037
7	-1.35643	0.96897	-1.28463	1.04258
8	-1.28619	0.88734	-1.20138	0.97534
9	-1.21538	0.80694	-1.11871	0.90905
10	-1.14388	0.72920	-1.03672	0.84413
11	-1.07163	0.65152	-0.95548	0.78094
12	-0.98389	0.56272	-0.85904	0.70773
13	-0.89500	0.47785	-0.76374	0.63763
14	-0.80512	0.39722	-0.66943	0.57054
15	-0.71446	0.32081	-0.57591	0.50604
16	-0.62316	0.24833	-0.48302	0.44362
17	-0.53130	0.17943	-0.39070	0.38283
18	-0.43890	0.11382	-0.29891	0.32327
19	-0.34598	0.05123	-0.20765	0.26466
20	-0.25250	-0.00855	-0.11694	0.20679
21	-0.15843	-0.06563	-0.02682	0.14959
22	-0.063384	-0.12014	0.06277	0.09310
23	0.03122	-0.17214	0.15190	0.03739
24	0.12663	-0.22169	0.24067	-0.01753
25	0.22229	-0.26888	0.37920	-0.07170
26	0.31813	-0.31387	0.41755	-0.12514
27	0.41411	-0.35680	0.50576	-0.17790
28	0.51018	-0.39781	0.59387	-0.22998
29	0.60632	-0.43703	0.68191	-0.28139
30	0.70250	-0.47458	0.76992	-0.33214
31	0.79869	-0.51057	0.85792	-0.38223
32	0.89486	-0.54510	0.94593	-0.43165
33	0.99099	-0.57828	1.03399	-0.48038
34	1.08704	-0.61019	1.12212	-0.52842
35	1.18301	-0.64095	1.21034	-0.57576
36	1.27888	-0.67065	1.29866	-0.62236
37	1.35868	-0.69465	1.37235	-0.66063
38	1.42824	-0.71505	1.43672	-0.69359
39	1.43589	-0.71464	1.44207	-0.69923
40	1.44226	-0.70817	1.44226	-0.70817

CHORD   3.67212   CAMBER   22.899   STAGGER   -33.284

PHASE I ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 10

NB 20

PT	PCT X	X	Y	B*M	T(M)		PT	XS	YS	XP	YP
1	0.	-1.63033	1.12706	-42.850	0.02070		1	-1.63033	1.12706	-1.63033	1.12706
2	0.02500	-1.55100	1.05354	-42.795	0.04299		2	-1.63338	1.11872	-1.62227	1.13073
3	0.05000	-1.47167	0.98023	-42.668	0.06514		3	-1.63054	1.11170	-1.61503	1.12843
4	0.07500	-1.39234	0.90744	-42.380	0.08694		4	-1.56561	1.03777	-1.53640	1.06931
5	0.10000	-1.31302	0.83566	-41.849	0.10820		5	-1.49375	0.95629	-1.44960	1.00418
6	0.12500	-1.23369	0.76555	-41.050	0.12873		6	-1.42164	0.87533	-1.36304	0.93955
7	0.15000	-1.15436	0.69769	-39.992	0.14835		7	-1.34911	0.79536	-1.27692	0.87596
8	0.17500	-1.07503	0.63255	-38.778	0.16691		8	-1.27596	0.71700	-1.19142	0.81409
9	0.20000	-0.99570	0.57022	-37.531	0.18428		9	-1.20203	0.64087	-1.10669	0.75452
10	0.23000	-0.90051	0.49901	-36.078	0.20349		10	-1.12730	0.56749	-1.02276	0.69760
11	0.26000	-0.80531	0.43135	-34.738	0.22081		11	-1.05183	0.43715	-0.93957	0.64329
12	0.29000	-0.71012	0.36687	-33.504	0.23618		12	-0.96042	0.41677	-0.84059	0.58124
13	0.32000	-0.61492	0.30523	-32.345	0.24953		13	-0.86822	0.34063	-0.74240	0.52208
14	0.35000	-0.51973	0.24623	-31.243	0.26074		14	-0.77530	0.26840	-0.64493	0.46534
15	0.38000	-0.42453	0.18969	-30.179	0.26970		15	-0.68167	0.19983	-0.54817	0.41064
16	0.41000	-0.32934	0.13549	-29.129	0.27634		16	-0.58735	0.13477	-0.45211	0.35769
17	0.44000	-0.23414	0.08358	-28.078	0.28054		17	-0.49232	0.07311	-0.35674	0.30626
18	0.47000	-0.13895	0.03391	-27.034	0.28221		18	-0.39660	0.01480	-0.26208	0.25618
19	0.50000	-0.04376	-0.01360	-26.015	0.28130		19	-0.30017	-0.04018	-0.16812	0.20734
20	0.53000	0.05144	-0.05905	-25.028	0.27793		20	-0.20309	-0.09178	-0.07481	0.15959
21	0.56000	0.14663	-0.10253	-24.080	0.27227		21	-0.10544	-0.14000	0.01793	0.11280
22	0.59000	0.24183	-0.14417	-23.172	0.26450		22	-0.00735	-0.18496	0.11023	0.06687
23	0.62000	0.33702	-0.18406	-22.305	0.25480		23	0.09109	-0.22682	0.20218	0.02176
24	0.65000	0.43222	-0.22230	-21.472	0.24329		24	0.18979	-0.26575	0.29387	-0.02258
25	0.68000	0.52741	-0.25897	-20.664	0.23012		25	0.28867	-0.30192	0.38537	-0.06619
26	0.71000	0.62261	-0.29412	-19.871	0.21544		26	0.38769	-0.33550	0.47674	-0.10910
27	0.74000	0.71780	-0.32779	-19.087	0.19938		27	0.48681	-0.36663	0.56801	-0.15131
28	0.77000	0.81299	-0.36001	-18.316	0.18209		28	0.58599	-0.39542	0.65922	-0.19282
29	0.80000	0.90819	-0.39083	-17.564	0.16368		29	0.68520	-0.42200	0.75040	-0.23358
30	0.83000	1.00338	-0.42029	-16.834	0.14429		30	0.78438	-0.44644	0.84161	-0.27358
31	0.86000	1.09858	-0.44845	-16.124	0.12400		31	0.88349	-0.46886	0.93289	-0.31280
32	0.89000	1.19377	-0.47535	-15.431	0.10296		32	0.98249	-0.48935	1.02428	-0.35124
33	0.92000	1.28897	-0.50101	-14.749	0.08127		33	1.08136	-0.50801	1.11580	-0.38889
34	0.95000	1.38416	-0.52547	-14.072	0.05903		34	1.18008	-0.52497	1.20747	-0.42572
35	0.97500	1.46349	-0.54494	-13.507	0.04015		35	1.27862	-0.54031	1.29931	-0.46171
36	1.00000	1.54282	-0.56358	-12.940	0.02109		36	1.37699	-0.55410	1.39134	-0.49684
							37	1.45880	-0.56446	1.46818	-0.52543
							38	1.52996	-0.57270	1.53527	-0.54976
							39	1.53744	-0.57104	1.54136	-0.55470
							40	1.54282	-0.56358	1.54282	-0.56358

CHORD 3.59544   CAMBER 29.910   STAGGER -28.049

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PHASE I ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 11

------- MEANLINE DATA -------

PT	PCT X	X	Y	B·M	T(M)
1	0.	-1.62293	0.91225	-40.702	0.02560
2	0.02500	-1.54148	0.84256	-40.394	0.04868
3	0.05000	-1.46003	0.77369	-40.021	0.07155
4	0.07500	-1.37858	0.70588	-39.504	0.09404
5	0.10000	-1.29714	0.63955	-38.774	0.11601
6	0.12500	-1.21569	0.57520	-37.805	0.13725
7	0.15000	-1.13424	0.51333	-36.601	0.15760
8	0.17500	-1.05279	0.45430	-35.245	0.17693
9	0.20000	-0.97134	0.39823	-33.832	0.19516
10	0.23000	-0.87360	0.33480	-32.135	0.21546
11	0.26000	-0.77586	0.27535	-30.490	0.23396
12	0.29000	-0.67813	0.21962	-28.895	0.25058
13	0.32000	-0.58039	0.16740	-27.336	0.26522
14	0.35000	-0.48265	0.11851	-25.824	0.27782
15	0.38000	-0.38491	0.07274	-24.375	0.28830
16	0.41000	-0.28717	0.02987	-23.002	0.29657
17	0.44000	-0.18943	-0.01032	-21.710	0.30254
18	0.47000	-0.09170	-0.04801	-20.474	0.30611
19	0.50000	0.00604	-0.08334	-19.270	0.30720
20	0.53000	0.10378	-0.11637	-18.080	0.30579
21	0.56000	0.20152	-0.14717	-16.893	0.30194
22	0.59000	0.29926	-0.17574	-15.703	0.29575
23	0.62000	0.39700	-0.20213	-14.507	0.28732
24	0.65000	0.49473	-0.22633	-13.313	0.27675
25	0.68000	0.59247	-0.24839	-12.131	0.26414
26	0.71000	0.69021	-0.26836	-10.968	0.24957
27	0.74000	0.78795	-0.28630	-9.827	0.23311
28	0.77000	0.88569	-0.30223	-8.684	0.21484
29	0.80000	0.98342	-0.31614	-7.519	0.19482
30	0.83000	1.08116	-0.32802	-6.331	0.17311
31	0.86000	1.17890	-0.33783	-5.132	0.14982
32	0.89000	1.27664	-0.34559	-3.951	0.12503
33	0.92000	1.37438	-0.35135	-2.810	0.09877
34	0.95000	1.47212	-0.35520	-1.698	0.07094
35	0.97500	1.55357	-0.35696	-0.782	0.04655
36	1.00000	1.63501	-0.35742	0.131	0.02158

------- SURFACE COORDINATES -------

PT	XS	YS	XP	YP
1	-1.62293	0.91225	-1.62293	0.91225
2	-1.62632	0.90172	-1.61317	0.91717
3	-1.62251	0.89321	-1.60405	0.91470
4	-1.55726	0.82402	-1.52571	0.86110
5	-1.48304	0.74629	-1.43703	0.80109
6	-1.40850	0.66960	-1.34867	0.74216
7	-1.33346	0.59433	-1.26081	0.68477
8	-1.25775	0.52098	-1.17362	0.62942
9	-1.18122	0.45007	-1.08725	0.57659
10	-1.10384	0.38205	-1.00174	0.52655
11	-1.02567	0.31718	-0.91701	0.47929
12	-0.93091	0.24357	-0.81630	0.42603
13	-0.83522	0.17455	-0.71651	0.37616
14	-0.73867	0.10993	-0.61759	0.32931
15	-0.64128	0.04960	-0.51949	0.28521
16	-0.54316	-0.00653	-0.42214	0.24355
17	-0.44440	-0.05856	-0.32542	0.20404
18	-0.34512	-0.10663	-0.22923	0.16636
19	-0.24539	-0.15086	-0.13348	0.13022
20	-0.14523	-0.19140	-0.03816	0.09537
21	-0.04465	-0.22833	0.05673	0.06165
22	0.05633	-0.26172	0.15123	0.02898
23	0.15765	-0.29162	0.24539	-0.00271
24	0.25924	-0.31810	0.33928	-0.03339
25	0.36101	-0.34120	0.43298	-0.06305
26	0.46287	-0.36099	0.52660	-0.09167
27	0.56472	-0.37751	0.62022	-0.11928
28	0.66647	-0.39087	0.71395	-0.14586
29	0.76806	-0.40114	0.80784	-0.17145
30	0.86947	-0.40842	0.90191	-0.19604
31	0.97068	-0.41271	0.99617	-0.21957
32	1.07162	-0.41405	1.09071	-0.24199
33	1.17220	-0.41244	1.18560	-0.26322
34	1.27233	-0.40795	1.28095	-0.28322
35	1.37196	-0.40068	1.37680	-0.30203
36	1.47107	-0.39065	1.47317	-0.31975
37	1.55325	-0.38024	1.55388	-0.33369
38	1.62435	-0.36937	1.62475	-0.34500
39	1.63135	-0.36651	1.63156	-0.34878
40	1.63501	-0.35742	1.63501	-0.35742

CHORD 3.49661   CAMBER 40.833   STAGGER -21.292

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 12

NB 20

---------- MEANLINE DATA ----------

PT	PCT X	X	Y	B+M	T(M)
1	0.	-1.64701	0.79605	-38.965	0.03474
2	0.02500	-1.56445	0.73014	-38.229	0.05714
3	0.05000	-1.48189	0.66601	-37.445	0.07927
4	0.07500	-1.39933	0.60373	-36.596	0.10101
5	0.10000	-1.31677	0.54344	-35.665	0.12226
6	0.12500	-1.23421	0.48528	-34.642	0.14288
7	0.15000	-1.15165	0.42941	-33.518	0.16272
8	0.17500	-1.06909	0.37596	-32.297	0.18169
9	0.20000	-0.98653	0.32507	-30.985	0.19973
10	0.23000	-0.88746	0.26750	-29.322	0.22001
11	0.26000	-0.78839	0.21377	-27.612	0.23871
12	0.29000	-0.68931	0.16379	-25.940	0.25569
13	0.32000	-0.59024	0.11728	-24.375	0.27088
14	0.35000	-0.49117	0.07392	-22.906	0.28419
15	0.38000	-0.39210	0.03349	-21.504	0.29556
16	0.41000	-0.29303	-0.00418	-20.126	0.30489
17	0.44000	-0.19395	-0.03914	-18.745	0.31203
18	0.47000	-0.09488	-0.07144	-17.375	0.31704
19	0.50000	0.00419	-0.10117	-16.032	0.31969
20	0.53000	0.10326	-0.12841	-14.718	0.31995
21	0.56000	0.20233	-0.15324	-13.429	0.31778
22	0.59000	0.30141	-0.17573	-12.149	0.31325
23	0.62000	0.40048	-0.19590	-10.861	0.30643
24	0.65000	0.49955	-0.21374	-9.548	0.29738
25	0.68000	0.59862	-0.22921	-8.191	0.28617
26	0.71000	0.69769	-0.24223	-6.770	0.27285
27	0.74000	0.79677	-0.25269	-5.276	0.25746
28	0.77000	0.89584	-0.26051	-3.736	0.24006
29	0.80000	0.99491	-0.26562	-2.171	0.22071
30	0.83000	1.09398	-0.26801	-0.584	0.19940
31	0.86000	1.19305	-0.26763	1.035	0.17618
32	0.89000	1.29213	-0.26439	2.719	0.15115
33	0.92000	1.39120	-0.25816	4.498	0.12433
34	0.95000	1.49027	-0.24874	6.380	0.09540
35	0.97500	1.57283	-0.23831	8.022	0.06956
36	1.00000	1.65539	-0.22545	9.692	0.04286

---------- SURFACE COORDINATES ----------

PT	XS	YS	XP	YP
1	-1.64701	0.79605	-1.64701	0.79605
2	-1.65114	0.78153	-1.63409	0.80312
3	-1.64561	0.77025	-1.62153	0.80016
4	-1.58213	0.70770	-1.54677	0.75259
5	-1.50599	0.63454	-1.45779	0.69747
6	-1.42944	0.56318	-1.36922	0.64428
7	-1.35241	0.49377	-1.28113	0.59311
8	-1.27482	0.42650	-1.19360	0.54406
9	-1.19658	0.36157	-1.10672	0.49724
10	-1.11763	0.29917	-1.02055	0.45275
11	-1.03794	0.23946	-0.93512	0.41068
12	-0.94133	0.17158	-0.83359	0.36341
13	-0.84371	0.10801	-0.73307	0.31953
14	-0.74524	0.04882	-0.63339	0.27875
15	-0.64614	-0.00609	-0.53435	0.24064
16	-0.54648	-0.05697	-0.43586	0.20481
17	-0.44627	-0.10401	-0.33793	0.17098
18	-0.34548	-0.14732	-0.24057	0.13896
19	-0.24410	-0.18690	-0.14381	0.10862
20	-0.14222	-0.22273	-0.04754	0.07984
21	-0.03995	-0.25480	0.04833	0.05246
22	0.06262	-0.28313	0.14390	0.02632
23	0.16543	-0.30779	0.23923	0.00130
24	0.26844	-0.32885	0.33437	-0.02262
25	0.37161	-0.34637	0.42935	-0.04543
26	0.47488	-0.36037	0.52421	-0.06711
27	0.57823	-0.37084	0.61901	-0.08758
28	0.68161	-0.37770	0.71378	-0.10676
29	0.78493	-0.38088	0.80860	-0.12451
30	0.88802	-0.38028	0.90366	-0.14073
31	0.99073	-0.37590	0.99909	-0.15535
32	1.09297	-0.36770	1.09500	-0.16831
33	1.19464	-0.35570	1.19146	-0.17955
34	1.29571	-0.33988	1.28854	-0.18890
35	1.39607	-0.32013	1.38632	-0.19618
36	1.49557	-0.29614	1.48497	-0.20134
37	1.57768	-0.27275	1.56798	-0.20387
38	1.63849	-0.25345	1.63055	-0.20443
39	1.65094	-0.24434	1.64603	-0.20974
40	1.65539	-0.22545	1.65539	-0.22545

CHORD   3.45678   CAMBER   48.657   STAGGER   -17.198

PHASE I ROTOR

MERIDIONAL AIRFOIL GEOMETRY - STREAMLINE 13

| | | ----- MEANLINE DATA ----- | | | | | ----- SURFACE COORDINATES ----- | | | |
PT	PCT X	X	Y	B*M	T(M)	PT	XS	YS	XP	YP
1	0.	-1.68351	0.69765	-33.040	0.05298	1	-1.68351	0.69765	-1.68351	0.69765
2	0.02500	-1.59952	0.64345	-32.621	0.07293	2	-1.68748	0.67516	-1.66494	0.71037
3	0.05000	-1.51553	0.59017	-32.148	0.09291	3	-1.67723	0.65887	-1.64558	0.70774
4	0.07500	-1.43154	0.53792	-31.615	0.11279	4	-1.61918	0.61274	-1.57986	0.67417
5	0.10000	-1.34755	0.48680	-31.026	0.13240	5	-1.54025	0.55084	-1.49081	0.62951
6	0.12500	-1.26356	0.43692	-30.374	0.15160	6	-1.46110	0.48989	-1.40198	0.58594
7	0.15000	-1.17957	0.38839	-29.645	0.17028	7	-1.38167	0.43007	-1.31343	0.54353
8	0.17500	-1.09558	0.34138	-28.806	0.18834	8	-1.30188	0.37152	-1.22523	0.50231
9	0.20000	-1.01158	0.29610	-27.832	0.20569	9	-1.22168	0.31439	-1.13745	0.46239
10	0.23000	-0.91079	0.24435	-26.489	0.22546	10	-1.14095	0.25886	-1.05020	0.42390
11	0.26000	-0.81001	0.19573	-24.989	0.24397	11	-1.05960	0.20515	-0.96357	0.38704
12	0.29000	-0.70922	0.15042	-23.419	0.26104	12	-0.96108	0.14345	-0.86051	0.34524
13	0.32000	-0.60843	0.10839	-21.850	0.27658	13	-0.86154	0.08517	-0.75847	0.30630
14	0.35000	-0.50764	0.06954	-20.313	0.29050	14	-0.76109	0.03065	-0.65734	0.27019
15	0.38000	-0.40685	0.03372	-18.830	0.30272	15	-0.65990	-0.01996	-0.55696	0.23675
16	0.41000	-0.30606	0.00074	-17.416	0.31315	16	-0.55806	-0.06667	-0.45722	0.20576
17	0.44000	-0.20527	-0.02957	-16.062	0.32170	17	-0.45570	-0.10954	-0.35800	0.17698
18	0.47000	-0.10448	-0.05733	-14.747	0.32829	18	-0.35292	-0.14866	-0.25920	0.15014
19	0.50000	-0.00369	-0.08265	-13.454	0.33283	19	-0.24977	-0.18414	-0.16077	0.12501
20	0.53000	0.09710	-0.10557	-12.172	0.33520	20	-0.14627	-0.21607	-0.06270	0.10141
21	0.56000	0.19789	-0.12615	-10.906	0.33536	21	-0.04241	-0.24450	0.03503	0.07920
22	0.59000	0.29868	-0.14444	-9.671	0.33328	22	0.06176	-0.26941	0.13244	0.05826
23	0.62000	0.39946	-0.16050	-8.433	0.32897	23	0.16616	-0.29080	0.22961	0.03851
24	0.65000	0.50025	-0.17429	-7.123	0.32251	24	0.27068	-0.30871	0.32667	0.01983
25	0.68000	0.60104	-0.18561	-5.670	0.31394	25	0.37534	-0.32321	0.42359	0.00221
26	0.71000	0.70183	-0.19418	-4.007	0.30335	26	0.48026	-0.33430	0.52025	-0.01428
27	0.74000	0.80262	-0.19960	-2.110	0.29077	27	0.58553	-0.34182	0.61655	-0.02941
28	0.77000	0.90341	-0.20149	-0.010	0.27624	28	0.69124	-0.34548	0.71243	-0.04288
29	0.80000	1.00420	-0.19953	2.268	0.25978	29	0.79727	-0.34488	0.80797	-0.05431
30	0.83000	1.10499	-0.19341	4.705	0.24135	30	0.90339	-0.33961	0.90343	-0.06337
31	0.86000	1.20578	-0.18284	7.284	0.22099	31	1.00934	-0.32932	0.99906	-0.06974
32	0.89000	1.30657	-0.16755	9.987	0.19881	32	1.11489	-0.31368	1.09509	-0.07314
33	0.92000	1.40736	-0.14725	12.802	0.17474	33	1.21979	-0.29245	1.19177	-0.07324
34	0.95000	1.50815	-0.12163	15.737	0.14821	34	1.32381	-0.26545	1.28933	-0.06965
35	0.97500	1.59214	-0.09596	18.261	0.12403	35	1.42672	-0.23245	1.38800	-0.06205
36	1.00000	1.67613	-0.06617	20.782	0.09882	36	1.52825	-0.19296	1.48805	-0.05030
						37	1.61157	-0.15485	1.57270	-0.03706
						38	1.64870	-0.13623	1.61168	-0.02980
						39	1.67352	-0.11116	1.64895	-0.03517
						40	1.67613	-0.06617	1.67613	-0.06617

CHORD 3.44537   CAMBER 53.822   STAGGER -12.809

3. PLANE SECTION BLADE COORDINATES

Figure 31 shows the stacked Phase I rotor plane sections. The following tabulation gives the coordinates for these sections. These sections are spaced one half inch apart, beginning at the tip height of 8.5 inches and progressing inward to 2.5 inches. These are the same section locations as given for the baseline rotor in Reference 1. Also included in the tabulation are coordinates for the section meanline, the meanline angle, and the section percent thickness at each point. Plane section chord, camber angle, and stagger angle are also given. These coordinates are intended to represent the blade under hot running conditions and do not include any corrections for blade untwist, meanline deformation, centrifugal growth or thermal growth.
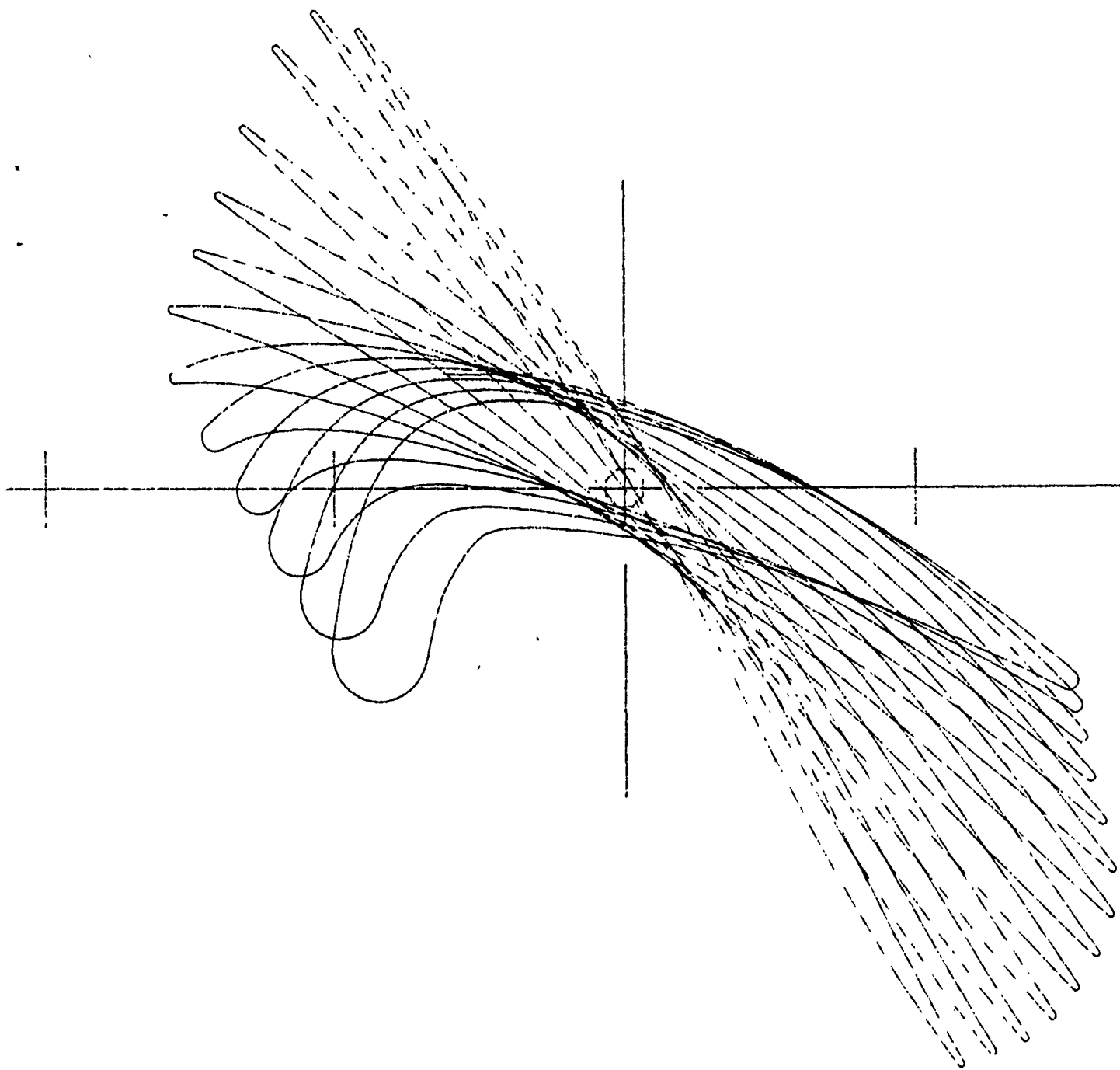
Figure 31. Stacked Phase I Rotor Plane Sections

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   STAGE 1. ROTOR   NB 20   MU 0.   ETA 0.

SECTION NO 1   SECTION AA   RHO 8.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.09072	55.896	0.01807	1.78981
2	-1.04499	56.592	0.02826	1.72115
3	-0.95238	57.934	0.04646	1.57692
4	-0.85840	59.264	0.06184	1.42256
5	-0.76282	60.552	0.07440	1.25750
6	-0.65585	61.774	0.08490	1.06303
7	-0.53731	62.528	0.09235	0.83794
8	-0.41699	62.318	0.09586	0.60671
9	-0.29537	61.282	0.09602	0.37949
10	-0.17326	59.782	0.09361	0.16309
11	-0.05111	58.423	0.08917	-0.04079
12	0.07067	57.522	0.08312	-0.23532
13	0.19180	56.946	0.07576	-0.42335
14	0.31176	56.493	0.06733	-0.60620
15	0.43038	55.999	0.05807	-0.78398
16	0.54759	55.511	0.04827	-0.95628
17	0.66296	55.131	0.03811	-1.12352
18	0.77650	54.920	0.02780	-1.28642
19	0.86957	54.941	0.01918	-1.41994

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.0250	0.00480	-1.09072	1.78981	56.212
2	0.0500	0.00770	-1.04171	1.71618	56.627
3	0.0750	0.01036	-0.99270	1.64069	57.386
4	0.1000	0.01276	-0.94369	1.56299	58.123
5	0.1250	0.01496	-0.89469	1.48309	58.819
6	0.1500	0.01693	-0.84568	1.40106	59.466
7	0.1750	0.01869	-0.79667	1.31691	60.102
8	0.2000	0.02024	-0.74767	1.23057	60.735
9	0.2300	0.02157	-0.69866	1.14203	61.318
10	0.2600	0.02291	-0.63985	1.03311	61.929
11	0.2900	0.02395	-0.58104	0.92177	62.351
12	0.3200	0.02473	-0.52223	0.80892	62.559
13	0.3500	0.02524	-0.46342	0.69565	62.523
14	0.3800	0.02553	-0.40462	0.58317	62.232
15	0.4100	0.02561	-0.34581	0.47250	61.773
16	0.4400	0.02551	-0.28700	0.36424	61.181
17		0.02525	-0.22819	0.25882	60.497

PHASE I ROTOR

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R 0.   STAGE 1. ROTOR   MU 0.   NB 20   ETA. 0.

SECTION NO 1   SECTION AA   RHO 8.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.02486	-0.16938	0.15643	59.744
19	0.5000	0.02434	-0.11057	0.05709	59.026
20	0.5300	0.02372	-0.05176	-0.03972	58.439
21	0.5600	0.02299	0.00705	-0.13454	57.960
22	0.5900	0.02217	0.06585	-0.22776	57.556
23	0.6200	0.02127	0.12466	-0.31967	57.228
24	0.6500	0.02029	0.18347	-0.41055	56.972
25	0.6800	0.01923	0.24228	-0.50065	56.763
26	0.7100	0.01811	0.30109	-0.59004	56.559
27	0.7400	0.01693	0.35990	-0.67874	56.342
28	0.7700	0.01569	0.41871	-0.76664	56.081
29	0.8000	0.01441	0.47752	-0.85363	55.809
30	0.8300	0.01309	0.53632	-0.93984	55.600
31	0.8600	0.01174	0.59513	-1.02546	55.432
32	0.8900	0.01035	0.65394	-1.11053	55.234
33	0.9200	0.00894	0.71275	-1.19506	55.113
34	0.9500	0.00751	0.77156	-1.27934	55.091
35	0.9750	0.00631	0.82057	-1.34961	55.123
36	1.0000	0.00510	0.86957	-1.41994	55.134

CHORD   STAGGER   CAMBER
3.7610   58.586   1.078

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER	
		ALPHA	UPSILON	ALPHA	UPSILON
1	0.00480	-1.09072	1.78981	-1.09072	1.78981
2	0.00480	-1.09483	1.78350	-1.08315	1.79119
3	0.00480	-1.09367	1.77697	-1.07771	1.78768
4	0.00770	-1.05380	1.70821	-1.02962	1.72415
5	0.01036	-1.00911	1.63019	-0.97630	1.65118
6	0.01276	-0.96408	1.55032	-0.92331	1.57567
7	0.01496	-0.91875	1.46853	-0.87062	1.49766
8	0.01693	-0.87311	1.38488	-0.81825	1.41724
9	0.01869	-0.82715	1.29939	-0.76620	1.33443
10	0.02024	-0.78086	1.21196	-0.71447	1.24917
11	0.02157	-0.73425	1.12256	-0.66307	1.16150
12	0.02291	-0.67786	1.01284	-0.60184	1.05338
13	0.02395	-0.62094	0.90086	-0.54114	0.94267
14	0.02473	-0.56350	0.78750	-0.48096	0.83035

PHASE I ROTOR

STAGE 1. ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   NB 20   ETA 0.

SECTION NO 1   SECTION AA   RHO 8.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0.02524	-0.50554	0.67375	-0.42131	0.71756
16	0.02553	-0.44709	0.56080	-0.36214	0.60584
17	0.02561	-0.38823	0.44973	-0.30338	0.49528
18	0.02551	-0.32902	0.34112	-0.24497	0.38736
19	0.02525	-0.26952	0.23543	-0.18686	0.26220
20	0.02486	-0.20976	0.13288	-0.12900	0.17999
21	0.02434	-0.14982	0.03353	-0.07132	0.08065
22	0.02372	-0.08976	-0.06306	-0.01376	-0.01638
23	0.02299	-0.02960	-0.15748	0.04369	-0.11161
24	0.02217	0.03067	-0.25012	0.10104	-0.20539
25	0.02127	0.09103	-0.34132	0.15829	-0.29802
26	0.02029	0.15149	-0.43134	0.21546	-0.38976
27	0.01923	0.21203	-0.52047	0.27253	-0.48063
28	0.01811	0.27267	-0.60881	0.32951	-0.57127
29	0.01693	0.33340	-0.69638	0.38639	-0.66109
30	0.01569	0.39422	-0.78310	0.44319	-0.75017
31	0.01441	0.45510	-0.86886	0.49993	-0.83840
32	0.01309	0.51601	-0.95375	0.55664	-0.92593
33	0.01174	0.57696	-1.03798	0.61330	-1.01294
34	0.01035	0.63795	-1.12162	0.66993	-1.09944
35	0.00894	0.69896	-1.20468	0.72654	-1.18545
36	0.00751	0.75997	-1.28742	0.78314	-1.27125
37	0.00631	0.81083	-1.35639	0.83030	-1.34283
38	0.00510	0.85602	-1.41770	0.87218	-1.40647
39	0.00510	0.86179	-1.42147	0.87370	-1.41317
40	0.00510	0.86957	-1.41994	0.86957	-1.41994

LE RAD 0.00963	CENTER AT ALPHA	-1.08535	UPSILON	1.78181
TE RAD 0.00984	CENTER AT ALPHA	0.86395	UPSILON	-1.41186

PHASE I ROTOR

STAGE 1. ROTOR   NB 20

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   ETA 0.

SECTION NO 1   SECTION AA   RHO 8.5000

CHORD   STAGGER   CAMBER
3.7610   58.586   1.078

AREA 0.263103   SURFACE ARC LENGTH 7.55250

	ALPHA	UPSILON
SECTION C.G.	-0.19974	0.25908
STREAMSURFACE SECTION C.G.	-0.19877	0.25407
BLADE AXIS	-0.19877	0.25407
STACKING AXIS (RADIAL)	-0.00100	0.

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ZPC

COORD SYSTEM ORIGIN Z -7.03620 R 0.   STAGE 1. ROTOR   MU 0.   NB 20   ETA 0.

SECTION NO 2   SECTION BB   RHO 8.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.19549	54.088	0.01903	1.75041
2	-1.14366	54.764	0.02912	1.67803
3	-1.03888	56.049	0.04746	1.52596
4	-0.93244	57.306	0.06331	1.36397
5	-0.82425	58.453	0.07662	1.19166
6	-0.70356	59.380	0.08817	0.99106
7	-0.56980	59.674	0.09682	0.76325
8	-0.43447	58.945	0.10141	0.53447
9	-0.29706	57.453	0.10236	0.31367
10	-0.16068	55.713	0.10031	0.10566
11	-0.02335	54.466	0.09595	-0.09066
12	0.11355	53.940	0.08967	-0.28036
13	0.24988	53.683	0.08182	-0.46660
14	0.38512	53.534	0.07267	-0.65011
15	0.51907	53.428	0.06252	-0.83087
16	0.65111	53.199	0.05170	-1.00820
17	0.78120	52.668	0.04054	-1.18045
18	0.90908	51.739	0.02939	-1.34551
19	1.01411	50.780	0.02031	-1.47626

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00487	-1.19549	1.75041	54.088
2	0.0250	0.00761	-1.14025	1.67320	54.779
3	0.0500	0.01016	-1.08501	1.59385	55.522
4	0.0750	0.01251	-1.02977	1.51238	56.187
5	0.1000	0.01467	-0.97453	1.42891	56.816
6	0.1250	0.01664	-0.91929	1.34344	57.432
7	0.1500	0.01842	-0.86405	1.25594	58.029
8	0.1750	0.02002	-0.80881	1.16644	58.601
9	0.2000	0.02143	-0.75357	1.07506	59.067
10	0.2300	0.02287	-0.68728	0.96352	59.455
11	0.2600	0.02404	-0.62099	0.85069	59.642
12	0.2900	0.02494	-0.55471	0.73748	59.624
13	0.3200	0.02559	-0.48842	0.62487	59.365
14	0.3500	0.02599	-0.42213	0.51400	58.840
15	0.3800	0.02618	-0.35584	0.40580	58.153
16	0.4100	0.02616	-0.28955	0.30068	57.355
17	0.4400	0.02597	-0.22327	0.19886	56.513

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   STAGE 1. ROTOR   MU 0.   NB 20   ETA 0.

SECTION NO 2   SECTION BB   RHO 8.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.02563	-0.15698	0.10022	55.679
19	0.5000	0.02515	-0.09069	0.00447	54.969
20	0.5300	0.02454	-0.02440	-0.08919	54.490
21	0.5600	0.02383	0.04188	-0.18153	54.179
22	0.5900	0.02300	0.10817	-0.27296	53.953
23	0.6200	0.02208	0.17446	-0.36378	53.801
24	0.6500	0.02107	0.24075	-0.45417	53.699
25	0.6800	0.01997	0.30704	-0.54429	53.627
26	0.7100	0.01880	0.37332	-0.63415	53.544
27	0.7400	0.01756	0.43961	-0.72374	53.465
28	0.7700	0.01625	0.50590	-0.81312	53.419
29	0.8000	0.01490	0.57219	-0.90238	53.366
30	0.8300	0.01349	0.63848	-0.99131	53.221
31	0.8600	0.01205	0.70476	-1.07964	52.993
32	0.8900	0.01059	0.77105	-1.16714	52.702
33	0.9200	0.00912	0.83734	-1.25359	52.312
34	0.9500	0.00764	0.90363	-1.33859	51.761
35	0.9750	0.00641	0.95887	-1.40803	51.242
36	1.0000	0.00519	1.01411	-1.47626	50.760

CHORD 3.9107   STAGGER 55.597   CAMBER 3.308

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
1	0.00487	-1.19549	1.75041	-1.19549	1.75041
2	0.00487	-1.19956	1.74364	-1.18758	1.75213
3	0.00487	-1.19806	1.73681	-1.18176	1.74862
4	0.00761	-1.15241	1.66462	-1.12809	1.68179
5	0.01016	-1.10139	1.58260	-1.06863	1.60510
6	0.01251	-1.05009	1.49876	-1.00944	1.52599
7	0.01467	-0.99854	1.41321	-0.95052	1.44461
8	0.01664	-0.94671	1.32592	-0.89186	1.36095
9	0.01842	-0.89461	1.23687	-0.83349	1.27502
10	0.02002	-0.84222	1.14604	-0.77539	1.18683
11	0.02143	-0.78952	1.05352	-0.71762	1.09660
12	0.02287	-0.72580	0.94079	-0.64876	0.98625
13	0.02404	-0.66156	0.82693	-0.58043	0.87445
14	0.02494	-0.59678	0.71282	-0.51263	0.76214

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PHASE I ROTOR

STAGE 1. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03620 R 0. MU 0. ETA 0.

SECTION NO 2 SECTION BB RHO 8.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER	
		ALPHA	UPSILON	ALPHA	UPSILON
15	0.02559	-0.53146	0.59938	-0.44537	0.65036
16	0.02599	-0.46562	0.48771	-0.37864	0.54030
17	0.02618	-0.39932	0.37879	-0.31236	0.43281
18	0.02616	-0.33263	0.27309	-0.24648	0.32828
19	0.02597	-0.26562	0.17084	-0.18091	0.22688
20	0.02563	-0.19836	0.07197	-0.11559	0.12848
21	0.02515	-0.13096	-0.02376	-0.05043	0.03270
22	0.02454	-0.06347	-0.11706	0.01467	-0.06131
23	0.02383	0.00411	-0.20880	0.07966	-0.15426
24	0.02300	0.07181	-0.29943	0.14454	-0.24650
25	0.02208	0.13962	-0.38928	0.20930	-0.33828
26	0.02107	0.20755	-0.47856	0.27395	-0.42978
27	0.01997	0.27559	-0.56745	0.33848	-0.52113
28	0.01880	0.34376	-0.65599	0.40289	-0.61231
29	0.01756	0.41203	-0.74418	0.46719	-0.70330
30	0.01625	0.48038	-0.83206	0.53142	-0.79418
31	0.01490	0.54881	-0.91976	0.59556	-0.88500
32	0.01349	0.61734	-1.00711	0.65961	-0.97552
33	0.01205	0.68594	-1.09383	0.72359	-1.06545
34	0.01059	0.75457	-1.17969	0.78753	-1.15459
35	0.00912	0.82323	-1.26449	0.85144	-1.24269
36	0.00764	0.89190	-1.34783	0.91535	-1.32935
37	0.00641	0.94909	-1.41588	0.96864	-1.40018
38	0.00519	0.99960	-1.47499	1.01579	-1.46183
39	0.00519	1.00593	-1.47849	1.01792	-1.46887
40	0.00519	1.01411	-1.47626	1.01411	-1.47626

LE RAD 0.01009 CENTER AT ALPHA -1.18957 UPSILON 1.74224

TE RAD 0.01043 CENTER AT ALPHA 1.00751 UPSILON -1.46616

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PHASE I ROTOR

STAGE   1. ROTOR   MU   0.   NB   20

COORD SYSTEM ORIGIN Z -7.03620 R 0.   ETA   0.

SECTION NO   2   SECTION BB   RHO   8.0000

CHORD   STAGGER   CAMBER
3.9107   55.597   3.308

AREA   0.288309   SURFACE ARC LENGTH   7.85357

	ALPHA	UPSILON
SECTION C.G.	-0.18399	0.19135
STREAMSURFACE SECTION C.G.	-0.18485	0.19120
BLADE AXIS	-0.18485	0.19120
STACKING AXIS (RADIAL)	-0.00100	0.

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PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   STAGE 1.   ROTOR   MU 0.   NB 20   ETA 0.

SECTION NO 3   SECTION CC   RHO 7.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.29948	52.349	0.01980	1.71047
2	-1.24238	52.958	0.03111	1.63559
3	-1.12703	54.083	0.05208	1.47934
4	-1.00996	55.094	0.07071	1.31448
5	-0.89125	55.898	0.08676	1.14146
6	-0.75889	56.436	0.10108	0.94355
7	-0.61264	56.307	0.11236	0.72266
8	-0.46466	54.935	0.11889	0.50530
9	-0.31539	52.743	0.12097	0.30075
10	-0.16547	50.651	0.11928	0.11111
11	-0.01515	49.301	0.11456	-0.06737
12	0.13507	48.742	0.10736	-0.24010
13	0.28511	48.489	0.09808	-0.41027
14	0.43459	48.375	0.08711	-0.57677
15	0.58317	48.357	0.07480	-0.74605
16	0.73068	48.346	0.06152	-0.91216
17	0.87690	48.174	0.04768	-1.07646
18	1.02171	47.608	0.03366	-1.23717
19	1.14127	46.848	0.02208	-1.36700

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.0250	0.00504	-1.29948	1.71047	52.349
2	0.0500	0.00811	-1.23846	1.63038	53.030
3	0.0500	0.01101	-1.17744	1.54841	53.634
4	0.0750	0.01372	-1.11642	1.46466	54.201
5	0.1000	0.01624	-1.05540	1.37921	54.735
6	0.1250	0.01858	-0.99438	1.29210	55.240
7	0.1500	0.02073	-0.93337	1.20343	55.673
8	0.1750	0.02267	-0.87235	1.11346	56.023
9	0.2000	0.02441	-0.81133	1.02243	56.295
10	0.2300	0.02622	-0.73811	0.91215	56.518
11	0.2600	0.02772	-0.66488	0.80137	56.506
12	0.2900	0.02892	-0.59166	0.69124	56.208
13	0.3200	0.02980	-0.51844	0.58295	55.605
14	0.3500	0.03040	-0.44522	0.47772	54.677
15	0.3800	0.03072	-0.37200	0.37638	53.613
16	0.4100	0.03079	-0.29877	0.27899	52.498
17	0.4400	0.03064	-0.22555	0.18541	51.437

PHASE I ROTOR

STAGE 1. ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   NB 20   ETA 0.

SECTION NO 3   SECTION CC   RHO 7.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.03029	-0.15233	0.09513	50.493
19	0.5000	0.02976	-0.07911	0.00755	49.749
20	0.5300	0.02907	-0.00588	-0.07813	49.260
21	0.5600	0.02823	0.06734	-0.16263	48.939
22	0.5900	0.02726	0.14056	-0.24635	48.729
23	0.6200	0.02615	0.21378	-0.32956	48.587
24	0.6500	0.02494	0.28701	-0.41242	48.482
25	0.6800	0.02362	0.36023	-0.49502	48.416
26	0.7100	0.02220	0.43345	-0.57749	48.390
27	0.7400	0.02070	0.50667	-0.65993	48.388
28	0.7700	0.01911	0.57989	-0.74237	48.390
29	0.8000	0.01747	0.65312	-0.82482	48.394
30	0.8300	0.01576	0.72634	-0.90728	48.396
31	0.8600	0.01402	0.79956	-0.98970	48.354
32	0.8900	0.01224	0.87278	-1.07186	48.213
33	0.9200	0.01044	0.94601	-1.15349	47.996
34	0.9500	0.00863	1.01923	-1.23444	47.736
35	0.9750	0.00713	1.08025	-1.30124	47.402
36	1.0000	0.00562	1.14127	-1.36700	46.848

CHORD	STAGGER	CAMBER
3.9279	51.582	5.500

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
1	0.00504	-1.29948	1.71047	-1.29948	1.71047
2	0.00504	-1.30352	1.70329	-1.29131	1.71251
3	0.00504	-1.30178	1.69624	-1.28512	1.70905
4	0.00811	-1.25119	1.62079	-1.22573	1.63996
5	0.01101	-1.19485	1.53558	-1.16003	1.56123
6	0.01372	-1.13827	1.44891	-1.09457	1.48042
7	0.01624	-1.08145	1.36079	-1.02936	1.39763
8	0.01858	-1.02436	1.27129	-0.96441	1.31290
9	0.02073	-0.96699	1.18048	-0.89975	1.22638
10	0.02267	-0.90927	1.08858	-0.83543	1.13834
11	0.02441	-0.85121	0.99583	-0.77145	1.04903
12	0.02622	-0.78105	0.88374	-0.69516	0.94055
13	0.02772	-0.71029	0.77133	-0.61948	0.83141
14	0.02892	-0.63886	0.65965	-0.54447	0.72282

PHASE I ROTOR

STAGE 1. ROTOR   NB 20

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   ETA 0.

SECTION NO 3   SECTION CC   RHO 7.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPSILON	LOWER ALPHA	UPSILON
15	0.02980	-0.56674	0.54989	-0.47014	0.61602
16	0.03040	-0.49393	0.44320	-0.39651	0.51224
17	0.03072	-0.42057	0.34059	-0.32342	0.41217
18	0.03079	-0.34675	0.24218	-0.25079	0.31581
19	0.03064	-0.27261	0.14789	-0.17849	0.22292
20	0.03029	-0.19823	0.05728	-0.10643	0.13298
21	0.02976	-0.12372	-0.03022	-0.03449	0.04532
22	0.02907	-0.04914	-0.11539	0.03737	-0.04087
23	0.02823	0.02553	-0.19905	0.10915	-0.12621
24	0.02726	0.10033	-0.28166	0.18079	-0.21104
25	0.02615	0.17526	-0.36354	0.25230	-0.29569
26	0.02494	0.25034	-0.44488	0.32368	-0.37995
27	0.02362	0.32553	-0.52581	0.39492	-0.46424
28	0.02220	0.40085	-0.60645	0.46605	-0.54854
29	0.02070	0.47628	-0.68692	0.53706	-0.63294
30	0.01911	0.55183	-0.76730	0.60796	-0.71744
31	0.01747	0.62747	-0.84760	0.67877	-0.80204
32	0.01576	0.70319	-0.92783	0.74949	-0.88672
33	0.01402	0.77899	-1.00800	0.82013	-0.97141
34	0.01224	0.85486	-1.08788	0.89071	-1.05584
35	0.01044	0.93077	-1.16721	0.96124	-1.13977
36	0.00863	1.00668	-1.24584	1.03177	-1.22304
37	0.00713	1.06994	-1.31071	1.09055	-1.29176
38	0.00562	1.12539	-1.36673	1.14207	-1.35117
39	0.00562	1.13255	-1.37005	1.14488	-1.35866
40	0.00562	1.14127	-1.36700	1.14127	-1.36700

LE RAD 0.01053   CENTER AT ALPHA -1.29306   UPSILON 1.70213
TE RAD 0.01141   CENTER AT ALPHA 1.13347   UPSILON -1.35867

PHASE I ROTOR

STAGE   1.   ROTOR   NB   20

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   ETA 0.

SECTION NO 3   SECTION CC   RHO   7.5000

CHORD   STAGGER   CAMBER
3.9279   51.582   5.500

AREA   0.336214   SURFACE ARC LENGTH   7.89553

	ALPHA	UPSILON
SECTION C.G.	-0.18161	0.19023
STREAMSURFACE SECTION C.G.	-0.19593	0.20195
BLADE AXIS	-0.19593	0.20195
STACKING AXIS (RADIAL)	-0.00100	0.

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   STAGE 1. ROTOR   MU 0.   NB 20   ETA 0.

SECTION NO 4   SECTION DD   RHO 7.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.38949	50.828	0.02000	1.64278
2	-1.32784	51.328	0.03383	1.56642
3	-1.20319	52.173	0.05990	1.40848
4	-1.07713	52.766	0.08355	1.24431
5	-0.94952	53.093	0.10436	1.07547
6	-0.80757	53.114	0.12356	0.88625
7	-0.65082	52.278	0.13953	0.67992
8	-0.49242	49.954	0.14974	0.48277
9	-0.33288	47.062	0.15424	0.30241
10	-0.17236	44.910	0.15363	0.13667
11	-0.01126	43.509	0.14871	-0.01980
12	0.15011	42.583	0.14011	-0.17044
13	0.31175	41.895	0.12835	-0.31711
14	0.47340	41.321	0.11396	-0.46065
15	0.63478	40.800	0.09742	-0.60134
16	0.79599	40.305	0.07929	-0.73931
17	0.95688	39.842	0.05996	-0.87468
18	1.11744	39.414	0.03980	-1.00758
19	1.25096	39.072	0.02255	-1.11683

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.0250	0.00524	-1.38949	1.64278	50.828
2	0.0500	0.00911	-1.32348	1.56098	51.336
3	0.0500	0.01280	-1.25747	1.47784	51.770
4	0.0750	0.01629	-1.19146	1.39337	52.211
5	0.1000	0.01959	-1.12545	1.30765	52.568
6	0.1250	0.02268	-1.05943	1.22102	52.800
7	0.1500	0.02555	-0.99342	1.13378	52.971
8	0.1750	0.02818	-0.92741	1.04604	53.103
9	0.2000	0.03058	-0.86140	0.95802	53.145
10	0.2300	0.03313	-0.78219	0.85247	53.049
11	0.2600	0.03531	-0.70297	0.74778	52.665
12	0.2900	0.03710	-0.62376	0.64518	51.937
13	0.3200	0.03850	-0.54455	0.54583	50.866
14	0.3500	0.03951	-0.46533	0.45082	49.445
15	0.3800	0.04015	-0.38612	0.36059	48.002
16	0.4100	0.04044	-0.30690	0.27467	46.667
17	0.4400	0.04042	-0.22769	0.19241	45.537

PHASE 1 ROTOR

STAGE 1. ROTOR   NB 20

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   ETA 0.

SECTION NO 4   SECTION DD   RHO 7.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.04010	-0.14848	0.11297	44.660
19	0.5000	0.03952	-0.06926	0.03568	43.952
20	0.5300	0.03869	0.00995	-0.03990	43.383
21	0.5600	0.03764	0.08916	-0.11412	42.903
22	0.5900	0.03638	0.16838	-0.18720	42.495
23	0.6200	0.03492	0.24759	-0.25932	42.140
24	0.6500	0.03328	0.32680	-0.33060	41.832
25	0.6800	0.03148	0.40602	-0.40115	41.555
26	0.7100	0.02954	0.48523	-0.47108	41.301
27	0.7400	0.02745	0.56445	-0.54034	41.049
28	0.7700	0.02526	0.64366	-0.60901	40.786
29	0.8000	0.02296	0.72287	-0.67704	40.531
30	0.8300	0.02057	0.80209	-0.74448	40.297
31	0.8600	0.01811	0.88130	-0.81138	40.063
32	0.8900	0.01558	0.96051	-0.87771	39.815
33	0.9200	0.01300	1.03973	-0.94347	39.597
34	0.9500	0.01037	1.11894	-1.00881	39.448
35	0.9750	0.00815	1.18495	-1.06300	39.305
36	1.0000	0.00591	1.25096	-1.11683	39.072

CHORD 3.8194   STAGGER 46.264   CAMBER 11.756

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
1	0.00524	-1.38949	1.64278	-1.38949	1.64278
2	0.00524	-1.39342	1.63537	-1.38130	1.64510
3	0.00524	-1.39152	1.62829	-1.37488	1.64180
4	0.00911	-1.33706	1.55011	-1.30990	1.57185
5	0.01280	-1.27667	1.46271	-1.23827	1.49296
6	0.01629	-1.21604	1.37431	-1.16687	1.41243
7	0.01959	-1.15516	1.28491	-1.09574	1.33039
8	0.02268	-1.09394	1.19483	-1.02493	1.24721
9	0.02555	-1.03237	1.10440	-0.95448	1.16316
10	0.02818	-0.97045	1.01373	-0.88438	1.07835
11	0.03058	-0.90812	0.92300	-0.81468	0.99304
12	0.03313	-0.83275	0.81444	-0.73163	0.89050
13	0.03531	-0.75658	0.70689	-0.64936	0.78868
14	0.03710	-0.67954	0.60150	-0.56798	0.68886

PHASE I ROTOR

STAGE   1.   ROTOR   NB   20

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   RHO 0.   ETA 0.

SECTION NO   4   SECTION DD   RHO   7.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0.03850	-0.60157	0.49943	-0.48752	0.59223
16	0.03951	-0.52266	0.40176	-0.40801	0.49988
17	0.04015	-0.44310	0.30929	-0.32914	0.41189
18	0.04044	-0.36308	0.22167	-0.25073	0.32767
19	0.04042	-0.28278	0.13834	-0.17261	0.24647
20	0.04010	-0.20230	0.05850	-0.09465	0.16744
21	0.03952	-0.12164	-0.01865	-0.01689	0.09001
22	0.03869	-0.04080	-0.09360	0.06070	0.01380
23	0.03764	0.04023	-0.16678	0.13810	-0.06147
24	0.03638	0.12145	-0.23842	0.21530	-0.13598
25	0.03492	0.20285	-0.30876	0.29233	-0.20987
26	0.03328	0.28442	-0.37795	0.36919	-0.28324
27	0.03148	0.36614	-0.44614	0.44590	-0.35616
28	0.02954	0.44800	-0.51343	0.52246	-0.42868
29	0.02745	0.53002	-0.57988	0.59888	-0.50081
30	0.02526	0.61215	-0.64552	0.67517	-0.57249
31	0.02296	0.69438	-0.71036	0.75136	-0.64371
32	0.02057	0.77668	-0.77445	0.82750	-0.71452
33	0.01811	0.85904	-0.83785	0.90356	-0.78491
34	0.01558	0.94146	-0.90057	0.97957	-0.85485
35	0.01300	1.02390	-0.96260	1.05555	-0.92434
36	0.01037	1.10636	-1.02410	1.13152	-0.99352
37	0.00815	1.17510	-1.07504	1.19481	-1.05097
38	0.00591	1.23475	-1.11892	1.24970	-1.10065
39	0.00591	1.24256	-1.12119	1.25351	-1.10778
40	0.00591	1.25096	-1.11683	1.25096	-1.11683

LE RAD 0.01075   CENTER AT ALPHA -1.38271   UPSILON   1.63444
TE RAD 0.01186   CENTER AT ALPHA   1.24176   UPSILON -1.10935

PHASE I ROTOR

STAGE 1. ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   NB 20   ETA 0.

SECTION NO 4   SECTION DD   RHO 7.0000

CHORD	STAGGER	CAMBER
3.8194	46.264	11.756

AREA 0.410323   SURFACE ARC LENGTH 7.70075

	ALPHA	UPSILON
SECTION C.G.	-0.18156	0.21303
STREAMSURFACE SECTION C.G.	-0.20669	0.22671
BLADE AXIS	-0.20669	0.22671
STACKING AXIS (RADIAL)	-0.00100	0.

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PHASE I ROTOR

STAGE 1. ROTOR   NB 20   ETA 0.

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.

SECTION NO   5   SECTION EE   RHO   6.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.46638	49.438	0.01980	1.55303
2	-1.40097	49.781	0.03708	1.47607
3	-1.26902	50.354	0.07001	1.31821
4	-1.13561	50.726	0.10029	1.15593
5	-1.00078	50.731	0.12738	0.99066
6	-0.85084	49.941	0.15271	0.80919
7	-0.68548	47.928	0.17411	0.61877
8	-0.51867	45.081	0.18851	0.44261
9	-0.35051	42.276	0.19600	0.28234
10	-0.18141	40.154	0.19688	0.13454
11	-0.01151	38.456	0.19175	-0.00432
12	0.15906	36.956	0.18145	-0.13605
13	0.33009	35.862	0.16670	-0.26163
14	0.50156	34.566	0.14821	-0.38211
15	0.67339	33.618	0.12651	-0.49835
16	0.84557	32.667	0.10215	-0.61082
17	1.01820	31.662	0.07563	-0.71934
18	1.19132	30.662	0.04729	-0.82391
19	1.33601	29.810	0.02250	-0.90824

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.0000	0.00531	-1.46638	1.55303	49.438
2	0.0250	0.01027	-1.39632	1.47057	49.838
3	0.0500	0.01504	-1.32626	1.38708	50.154
4	0.0750	0.01959	-1.25620	1.30272	50.419
5	0.1000	0.02392	-1.18614	1.21764	50.628
6	0.1250	0.02800	-1.11608	1.13202	50.779
7	0.1500	0.03183	-1.04602	1.04610	50.808
8	0.1750	0.03537	-0.97596	0.96031	50.689
9	0.2000	0.03862	-0.90590	0.87519	50.360
10	0.2300	0.04209	-0.82183	0.77486	49.660
11	0.2600	0.04507	-0.73776	0.67748	48.660
12	0.2900	0.04756	-0.65369	0.58386	47.426
13	0.3200	0.04956	-0.56962	0.49455	46.008
14	0.3500	0.05108	-0.48555	0.40975	44.470
15	0.3800	0.05213	-0.40147	0.32929	43.042
16	0.4100	0.05273	-0.31740	0.25249	41.803
17	0.4400	0.05289	-0.23333	0.17877	40.719

STAGE 1. ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R O.   MU O.   NB 20   ETA O.

SECTION NO 5   SECTION EE   RHO 6.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.05264	-0.14926	0.10761	39.788
19	0.5000	0.05200	-0.06519	0.03865	38.939
20	0.5300	0.05101	0.01889	-0.02832	38.155
21	0.5600	0.04970	0.10296	-0.09350	37.417
22	0.5900	0.04808	0.18703	-0.15700	36.723
23	0.6200	0.04618	0.27110	-0.21898	36.077
24	0.6500	0.04403	0.35517	-0.27956	35.484
25	0.6800	0.04164	0.43924	-0.33888	34.937
26	0.7130	0.03904	0.52332	-0.39706	34.433
27	0.7400	0.03625	0.60739	-0.45418	33.963
28	0.7700	0.03327	0.69146	-0.51034	33.523
29	0.8000	0.03012	0.77553	-0.56558	33.070
30	0.8300	0.02683	0.85960	-0.61981	32.583
31	0.8600	0.02341	0.94367	-0.67302	32.082
32	0.8900	0.01987	1.02775	-0.72521	31.580
33	0.9200	0.01622	1.11182	-0.77639	31.089
34	0.9500	0.01247	1.19589	-0.82662	30.620
35	0.9750	0.00927	1.26595	-0.86776	30.225
36	1.0000	0.00603	1.33601	-0.90824	29.810

CHORD 3.7298   STAGGER 41.292   CAMBER 19.628

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
1	0.00531	-1.46638	1.55303	-1.46638	1.55303
2	0.00531	-1.47014	1.54555	-1.45830	1.55557
3	0.00531	-1.46815	1.53855	-1.45180	1.55252
4	0.01027	-1.41095	1.45822	-1.38169	1.48292
5	0.01504	-1.34779	1.36911	-1.30473	1.40504
6	0.01959	-1.28436	1.27944	-1.22805	1.32599
7	0.02392	-1.22062	1.18935	-1.15166	1.24594
8	0.02800	-1.15654	1.09900	-1.07563	1.16504
9	0.03183	-1.09203	1.00859	-1.00002	1.08361
10	0.03537	-1.02701	0.91852	-0.92492	1.00211
11	0.03862	-0.96136	0.82924	-0.85044	0.92113
12	0.04209	-0.88166	0.72405	-0.76201	0.82567
13	0.04507	-0.80089	0.62198	-0.67463	0.73298
14	0.04756	-0.71901	0.52385	-0.58837	0.64387

COORD SYSTEM ORIGIN Z -7.03620 R 0.   STAGE 1. ROTOR   MU 0.   NB 20   ETA 0.

SECTION NO 5   SECTION EE   RHO 6.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	UPSILON
15	0.04956	-0.63612	0.43035	-0.50312	0.55675
16	0.05108	-0.55228	0.34177	-0.41881	0.47773
17	0.05213	-0.46783	0.25823	-0.33512	0.40034
18	0.05273	-0.38295	0.17919	-0.25185	0.32580
19	0.05289	-0.29768	0.10400	-0.16898	0.25353
20	0.05264	-0.21208	0.03217	-0.08643	0.18305
21	0.05200	-0.12614	-0.03678	-0.00423	0.11409
22	0.05101	-0.03989	-0.10313	0.07766	0.04648
23	0.04970	0.04664	-0.16711	0.15927	-0.01989
24	0.04808	0.13342	-0.22887	0.24064	-0.08514
25	0.04618	0.22038	-0.28858	0.32182	-0.14937
26	0.04403	0.30751	-0.34642	0.40283	-0.21270
27	0.04164	0.39477	-0.40255	0.48372	-0.27522
28	0.03904	0.48214	-0.45711	0.56449	-0.33700
29	0.03625	0.56963	-0.51024	0.64515	-0.39812
30	0.03327	0.65720	-0.56206	0.72572	-0.45862
31	0.03012	0.74488	-0.61264	0.80618	-0.51849
32	0.02683	0.83266	-0.66196	0.88655	-0.57765
33	0.02341	0.92049	-0.71001	0.96686	-0.63604
34	0.01987	1.00834	-0.75678	1.04715	-0.69365
35	0.01622	1.09619	-0.80231	1.12744	-0.75048
36	0.01247	1.18404	-0.84663	1.20774	-0.80660
37	0.00927	1.25725	-0.88270	1.27465	-0.85282
38	0.00603	1.32026	-0.91314	1.33230	-0.89219
39	0.00603	1.32834	-0.91400	1.33714	-0.89686
40	0.00603	1.33601	-0.90824	1.33601	-0.90824

| LE RAD | 0.01080 | CENTER AT ALPHA | -1.45937 | UPSILON | 1.54483 |
| TE RAD | 0.01212 | CENTER AT ALPHA | 1.32549 | UPSILON | -0.90221 |

PHASE I ROTOR

STAGE   1. ROTOR   NB   20

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   ETA 0.

SECTION NO   5   SECTION EE   RHO   6.5000

CHORD   STAGGER   CAMBER
3.7298   41.292   19.628

AREA   0.505076   SURFACE ARC LENGTH   7.55619

	ALPHA	UPSILON
SECTION C.G.	-0.18298	0.20846
STREAMSURFACE SECTION C.G.	-0.21253	0.21662
BLADE AXIS	-0.21253	0.21662
STACKING AXIS (RADIAL)	-0.00100	0.

ZPC

STAGE 1. ROTOR   MB 20

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   ETA 0.

SECTION NO 6   SECTION FF   RHO 6.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.53207	48.313	0.01899	1.44821
2	-1.46347	48.571	0.03919	1.37084
3	-1.32501	48.936	0.07765	1.21307
4	-1.18517	48.944	0.11314	1.05242
5	-1.04390	48.298	0.14509	0.89181
6	-0.88705	46.454	0.17520	0.72057
7	-0.71414	43.360	0.20112	0.54779
8	-0.53984	40.185	0.21955	0.39209
9	-0.36436	37.577	0.23043	0.25074
10	-0.16784	35.597	0.23352	0.11974
11	-0.01043	33.809	0.22903	-0.00326
12	0.16786	31.986	0.21787	-0.11866
13	0.34685	30.211	0.20091	-0.22668
14	0.52659	28.523	0.17894	-0.32781
15	0.70719	26.890	0.15269	-0.42265
16	0.88855	25.238	0.12274	-0.51139
17	1.07096	23.507	0.08964	-0.59405
18	1.25457	21.625	0.05384	-0.67038
19	1.40862	19.852	0.02220	-0.72874

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00519	-1.53207	1.44821	48.313
2	0.0250	0.01110	-1.45855	1.36527	48.563
3	0.0500	0.01678	-1.38503	1.28170	48.755
4	0.0750	0.02220	-1.31152	1.19759	48.927
5	0.1000	0.02737	-1.23800	1.11311	48.983
6	0.1250	0.03227	-1.16448	1.02871	48.875
7	0.1500	0.03688	-1.09097	0.94490	48.583
8	0.1750	0.04116	-1.01745	0.86223	48.088
9	0.2000	0.04509	-0.94393	0.78136	47.304
10	0.2300	0.04933	-0.85571	0.68788	45.943
11	0.2600	0.05301	-0.76749	0.59911	44.383
12	0.2900	0.05614	-0.67927	0.51522	42.715
13	0.3200	0.05874	-0.59105	0.43606	41.099
14	0.3500	0.06081	-0.50283	0.36114	39.598
15	0.3800	0.06235	-0.41461	0.28990	38.272
16	0.4100	0.06334	-0.32639	0.22173	37.141
17	0.4400	0.06380	-0.23817	0.15614	36.139

*ZPCx

STAGE 1. ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   NB 20   ETA 0.

SECTION NO 6   SECTION FF   RHO 6.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.06373	-0.14995	0.09278	35.245
19	0.5000	0.06315	-0.06172	0.03146	34.353
20	0.5300	0.06211	0.02650	-0.02782	33.443
21	0.5600	0.06063	0.11472	-0.08510	32.540
22	0.5900	0.05876	0.20294	-0.14043	31.651
23	0.6200	0.05651	0.29116	-0.19388	30.772
24	0.6500	0.05392	0.37933	-0.24551	29.907
25	0.6800	0.05101	0.46760	-0.29539	29.067
26	0.7100	0.04782	0.55582	-0.34361	28.256
27	0.7400	0.04436	0.64404	-0.39024	27.457
28	0.7700	0.04066	0.73226	-0.43531	26.665
29	0.8000	0.03672	0.82048	-0.47884	25.864
30	0.8300	0.03259	0.90870	-0.52085	25.030
31	0.8600	0.02826	0.99692	-0.56130	24.217
32	0.8900	0.02377	1.08514	-0.60020	23.362
33	0.9200	0.01912	1.17336	-0.63750	22.471
34	0.9500	0.01433	1.26159	-0.67316	21.533
35	0.9750	0.01022	1.33510	-0.70156	20.712
36	1.0000	0.00607	1.40862	-0.72874	19.852

CHORD 3.6588   STAGGER 36.512   CAMBER 28.461

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
1	0.00519	-1.53207	1.44821	-1.53207	1.44821
2	0.00519	-1.53557	1.44090	-1.52434	1.45083
3	0.00519	-1.53359	1.43421	-1.51799	1.44808
4	0.01110	-1.47378	1.35183	-1.44333	1.37871
5	0.01678	-1.40811	1.26146	-1.36196	1.30194
6	0.02220	-1.34213	1.17091	-1.28090	1.22428
7	0.02737	-1.27578	1.08025	-1.20022	1.14598
8	0.03227	-1.20896	0.98988	-1.12001	1.06754
9	0.03688	-1.14156	0.90027	-1.04038	0.98953
10	0.04116	-1.07348	0.81193	-0.96142	0.91252
11	0.04509	-1.00456	0.72543	-0.88330	0.83730
12	0.04933	-0.92056	0.62513	-0.79086	0.75063
13	0.05301	-0.83532	0.52981	-0.69966	0.66842
14	0.05614	-0.74894	0.43976	-0.60959	0.59069

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   NB 20   ETA 0.

STAGE 1. ROTOR

SECTION NO 6   SECTION FF   RHO 6.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0.05874	-0.66169	0.35508	-0.52041	0.51705
16	0.06081	-0.57374	0.27543	-0.43192	0.44686
17	0.06235	-0.48525	0.20036	-0.34396	0.37945
18	0.06334	-0.39635	0.12936	-0.25642	0.31411
19	0.06380	-0.30700	0.06188	-0.16933	0.25040
20	0.06373	-0.21722	-0.00244	-0.08267	0.18799
21	0.06315	-0.12692	-0.06392	0.00347	0.12684
22	0.06211	-0.03612	-0.12263	0.08911	0.06698
23	0.06063	0.05505	-0.17860	0.17438	0.00841
24	0.05876	0.14653	-0.23193	0.25934	-0.04893
25	0.05651	0.23827	-0.28270	0.34405	-0.10506
26	0.05392	0.33020	-0.33101	0.42856	-0.16001
27	0.05101	0.42226	-0.37696	0.51294	-0.21382
28	0.04782	0.51441	-0.42067	0.59723	-0.26656
29	0.04436	0.60662	-0.46225	0.68146	-0.31823
30	0.04066	0.69888	-0.50177	0.76564	-0.36884
31	0.03672	0.79117	-0.53930	0.84979	-0.41839
32	0.03259	0.88346	-0.57485	0.93394	-0.46684
33	0.02826	0.97572	-0.60845	1.01813	-0.51415
34	0.02377	1.06790	-0.64011	1.10239	-0.56028
35	0.01912	1.15999	-0.66983	1.18674	-0.60517
36	0.01433	1.25196	-0.69754	1.27121	-0.64877
37	0.01022	1.32849	-0.71906	1.34172	-0.58407
38	0.00607	1.39400	-0.73640	1.40063	-0.71269
39	0.00607	1.40202	-0.73575	1.40785	-0.71852
40	0.00607	1.40862	-0.72874	1.40862	-0.72874

LE RAD 0.01049   CENTER AT ALPHA   -1.52510   UPSILON   1.44037
TE RAD 0.01231   CENTER AT ALPHA   1.39707   UPSILON   -0.72447

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PHASE I ROTOR

ZPC

STAGE   1.   ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   NB 20   ETA 0.

SECTION NO 6   SECTION FF   RHO 6.0000

CHORD   STAGGER   CAMBER
3.6588   36.512   28.461

AREA   0.582035   SURFACE ARC LENGTH   7.45756

                                    ALPHA   UPSILON
SECTION C.G.   -0.17715   0.18590
STREAMSURFACE SECTION C.G.   -0.20689   0.18518
BLADE AXIS   -0.20689   0.18518
STACKING AXIS (RADIAL)   -0.00100   0.

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PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   STAGE 1.   ROTOR   NB 20

SECTION NO 7   SECTION GG   MU 0.   ETA 0.   RHO 5.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.58098	47.252	0.01813	1.32779
2	-1.50888	47.348	0.03981	1.24933
3	-1.36318	47.292	0.08145	1.09061
4	-1.21584	46.603	0.12037	0.93250
5	-1.06693	45.028	0.15583	0.77881
6	-0.90161	42.352	0.18981	0.62049
7	-0.71977	38.999	0.21998	0.46421
8	-0.53666	36.087	0.24245	0.32391
9	-0.35271	33.704	0.25684	0.19587
10	-0.16800	31.508	0.26263	0.07785
11	0.01745	29.269	0.25961	-0.03087
12	0.20348	26.986	0.24872	-0.13029
13	0.39017	24.734	0.23101	-0.22061
14	0.57749	22.428	0.20731	-0.30271
15	0.76547	19.916	0.17835	-0.37570
16	0.95418	17.103	0.14457	-0.43905
17	1.14336	13.798	0.10603	-0.49168
18	1.33295	9.780	0.06225	-0.53140
19	1.49099	5.755	0.02107	-0.55282

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.0250	0.00503	-1.58098	1.32779	47.252
2	0.0500	0.01144	-1.50418	1.24422	47.480
3	0.0750	0.01762	-1.42738	1.16055	47.411
4	0.1000	0.02357	-1.35059	1.07715	47.299
5	0.1250	0.02928	-1.27379	0.99429	47.013
6	0.1500	0.03473	-1.19699	0.91260	46.476
7	0.1750	0.03988	-1.12019	0.83276	45.703
8	0.2000	0.04471	-1.04339	0.75538	44.689
9	0.2300	0.04919	-0.96659	0.68094	43.494
10	0.2600	0.05408	-0.87443	0.59593	41.841
11	0.2900	0.05844	-0.78227	0.51585	40.134
12	0.3200	0.06223	-0.69011	0.44043	38.460
13	0.3500	0.06547	-0.59795	0.36924	36.940
14	0.3800	0.06814	-0.50579	0.30162	35.627
15	0.4100	0.07024	-0.41363	0.23704	34.424
16	0.4400	0.07175	-0.32147	0.17521	33.300
17		0.07266	-0.22931	0.11593	32.204

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R O.   STAGE 1. ROTOR   MU O.   NB 20   ETA O.

SECTION NO 7   SECTION GG   RHO 5.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.07294	-0.13715	0.05909	31.118
19	0.5000	0.07262	-0.04500	0.00465	30.016
20	0.5300	0.07173	0.04716	-0.04739	28.890
21	0.5600	0.07032	0.13932	-0.09707	27.764
22	0.5900	0.06843	0.23148	-0.14445	26.647
23	0.6200	0.06609	0.32364	-0.18958	25.540
24	0.6500	0.06333	0.41580	-0.23254	24.442
25	0.6800	0.06018	0.50796	-0.27335	23.321
26	0.7100	0.05666	0.60012	-0.31199	22.164
27	0.7400	0.05281	0.69228	-0.34841	20.949
28	0.7700	0.04863	0.78444	-0.38253	19.663
29	0.8000	0.04415	0.87660	-0.41425	18.315
30	0.8300	0.03936	0.96876	-0.44351	16.904
31	0.8600	0.03426	1.06092	-0.47020	15.360
32	0.8900	0.02885	1.15308	-0.49406	13.639
33	0.9200	0.02312	1.24524	-0.51482	11.711
34	0.9500	0.01697	1.33739	-0.53215	9.555
35	0.9750	0.01150	1.41419	-0.54378	7.662
36	1.0000	0.00585	1.49099	-0.55282	5.755

CHORD 3.6019   STAGGER 31.474   CAMBER 41.496

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
1	0.00503	-1.58098	1.32779	-1.58098	1.32779
2	0.00503	-1.58422	1.32072	-1.57367	1.33043
3	0.00503	-1.58223	1.31438	-1.56752	1.32792
4	0.01144	-1.51937	1.23030	-1.48900	1.25814
5	0.01762	-1.45075	1.13907	-1.40402	1.18203
6	0.02357	-1.38178	1.04836	-1.31939	1.10594
7	0.02928	-1.31236	0.95833	-1.23521	1.03024
8	0.03473	-1.24234	0.86953	-1.15163	0.95567
9	0.03988	-1.17159	0.78261	-1.06878	0.88292
10	0.04471	-1.10001	0.69814	-0.98677	0.81262
11	0.04919	-1.02756	0.61668	-0.90562	0.74520
12	0.05408	-0.93940	0.52337	-0.80945	0.66850
13	0.05844	-0.85011	0.43539	-0.71443	0.59631
14	0.06223	-0.75982	0.35267	-0.62040	0.52820

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PHASE I ROTOR

STAGE 1. ROTOR   NB 20

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   ETA 0.

SECTION NO 7   SECTION GG   RHO 5.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0.06547	-0.66881	0.27500	-0.52709	0.46348
16	0.06814	-0.57728	0.20186	-0.43430	0.40137
17	0.07024	-0.48515	0.13269	-0.34212	0.34139
18	0.07175	-0.39242	0.06721	-0.25053	0.28321
19	0.07266	-0.29905	0.00521	-0.15958	0.22664
20	0.07294	-0.20504	-0.05337	-0.06926	0.17185
21	0.07262	-0.11042	-0.10859	0.02043	0.11790
22	0.07173	-0.01525	-0.16050	0.10958	0.06572
23	0.07032	0.08033	-0.20914	0.19832	0.01499
24	0.06843	0.17621	-0.25459	0.28675	-0.03430
25	0.06609	0.27233	-0.29697	0.37496	-0.08219
26	0.06333	0.36861	-0.33637	0.46299	-0.12871
27	0.06018	0.46506	-0.37287	0.55086	-0.17383
28	0.05666	0.56162	-0.40650	0.63862	-0.21749
29	0.05281	0.65828	-0.43723	0.72628	-0.25960
30	0.04863	0.75497	-0.46500	0.81391	-0.30005
31	0.04415	0.85161	-0.48974	0.90158	-0.33877
32	0.03936	0.94815	-0.51133	0.98937	-0.37569
33	0.03426	1.04457	-0.52969	1.07726	-0.41070
34	0.02885	1.14082	-0.54455	1.16533	-0.44356
35	0.02312	1.23678	-0.55559	1.25369	-0.47404
36	0.01697	1.33232	-0.56230	1.34247	-0.50201
37	0.01150	1.41143	-0.56431	1.41696	-0.52326
38	0.00585	1.47935	-0.56361	1.48186	-0.53990
39	0.00585	1.48639	-0.56110	1.48860	-0.54430
40	0.00585	1.49099	-0.55282	1.49099	-0.55282

LE RAD 0.01005   CENTER AT ALPHA -1.57418   UPSILON   1.32039
TE RAD 0.01203   CENTER AT ALPHA   1.47903   UPSILON -0.55159

ZPC

STAGE   1.   ROTOR   NB   20

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   ETA 0.

SECTION NO 7   SECTION GG   RHO 5.5000

CHORD   STAGGER   CAMBER
3.6019   31.474   41.496

AREA   0.646538   SURFACE ARC LENGTH   7.40980

	ALPHA	UPSILON
SECTION C.G.	-0.14018	0.13937
STREAMSURFACE SECTION C.G.	-0.16879	0.12983
BLADE AXIS	-0.16879	0.12983
STACKING AXIS (RADIAL)	-0.00100	0.

PHASE I ROTOR

STAGE   1.   ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   NB 20   ETA 0.

SECTION NO   8   SECTION HH   RHO   5.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.58955	45.788	0.01892	1.18804
2	-1.51252	45.722	0.04109	1.10902
3	-1.35751	45.309	0.08429	0.95102
4	-1.20163	44.020	0.12521	0.79651
5	-1.04535	41.687	0.16276	0.65112
6	-0.87315	38.679	0.19909	0.50573
7	-0.68520	35.695	0.23198	0.36340
8	-0.49742	33.042	0.25732	0.23502
9	-0.30980	30.421	0.27455	0.11892
10	-0.12232	27.696	0.28310	0.01475
11	0.06502	24.939	0.28260	-0.07782
12	0.25202	22.123	0.27385	-0.15913
13	0.43853	19.105	0.25784	-0.22915
14	0.62439	15.724	0.23521	-0.28735
15	0.80912	11.805	0.20617	-0.33252
16	0.99188	6.927	0.17039	-0.36280
17	1.17166	0.731	0.12725	-0.37509
18	1.34671	-7.116	0.07632	-0.36579
19	1.48795	-15.638	0.02844	-0.33746

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00551	-1.58955	1.18804	45.788
2	0.0250	0.01195	-1.51261	1.10912	45.690
3	0.0500	0.01828	-1.43568	1.03042	45.577
4	0.0750	0.02444	-1.35874	0.95226	45.301
5	0.1000	0.03043	-1.28180	0.87511	44.811
6	0.1250	0.03621	-1.20486	0.79963	44.045
7	0.1500	0.04175	-1.12793	0.72643	43.027
8	0.1750	0.04701	-1.05099	0.65616	41.788
9	0.2000	0.05196	-0.97405	0.58903	40.421
10	0.2300	0.05748	-0.88173	0.51761	38.808
11	0.2600	0.06249	-0.78940	0.44040	37.266
12	0.2900	0.06700	-0.69708	0.37196	35.852
13	0.3200	0.07097	-0.60475	0.30685	34.536
14	0.3500	0.07441	-0.51243	0.24482	33.252
15	0.3800	0.07728	-0.42010	0.18573	31.980
16	0.4100	0.07956	-0.32778	0.12953	30.674
17	0.4400	0.08123	-0.23545	0.07620	29.339

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   STAGE 1. ROTOR   NB 20

SECTION NO 8   SECTION HH   MU 0.   RHO 5.0000   ETA 0.

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.08228	-0.14313	0.02573	27.964
19	0.5000	0.08267	-0.05080	-0.02192	26.616
20	0.5300	0.08243	0.04152	-0.06682	25.249
21	0.5600	0.08160	0.13385	-0.10902	23.875
22	0.5900	0.08021	0.22617	-0.14855	22.466
23	0.6200	0.07830	0.31850	-0.18538	21.015
24	0.6500	0.07589	0.41082	-0.21946	19.503
25	0.6800	0.07299	0.50315	-0.25075	17.914
26	0.7100	0.06963	0.59547	-0.27910	16.205
27	0.7400	0.06579	0.68780	-0.30436	14.366
28	0.7700	0.06148	0.78012	-0.32633	12.378
29	0.8000	0.05666	0.87245	-0.34479	10.192
30	0.8300	0.05123	0.96477	-0.35935	7.666
31	0.8600	0.04533	1.05710	-0.36947	4.788
32	0.8900	0.03874	1.14942	-0.37464	1.563
33	0.9200	0.03146	1.24175	-0.37428	-2.134
34	0.9500	0.02339	1.33407	-0.36733	-6.599
35	0.9750	0.01601	1.41101	-0.35555	-10.883
36	1.0000	0.00828	1.48795	-0.33746	-15.638

CHORD 3.4348   STAGGER 26.367   CAMBER 61.426

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
1	0.00551	-1.58955	1.18804	-1.58955	1.18804
2	0.00551	-1.59271	1.18056	-1.58203	1.19100
3	0.00551	-1.59044	1.17403	-1.57553	1.18856
4	0.01195	-1.52730	1.09478	-1.49792	1.12346
5	0.01828	-1.45809	1.00845	-1.41326	1.05239
6	0.02444	-1.38850	0.92273	-1.32890	0.98179
7	0.03043	-1.31864	0.83803	-1.24497	0.91219
8	0.03621	-1.24810	0.75493	-1.16162	0.84434
9	0.04175	-1.17625	0.67406	-1.07900	0.77890
10	0.04701	-1.10479	0.59596	-0.99719	0.71636
11	0.05196	-1.03192	0.52108	-0.91619	0.65697
12	0.05748	-0.94359	0.43569	-0.81986	0.58953
13	0.06249	-0.85439	0.35499	-0.72442	0.52581
14	0.06700	-0.76447	0.27870	-0.62969	0.46522

set of vectors which would produce the same circulation as the actual blade taking into account the change in streamline radius and meridional velocity. The difference between the deviation angle implied by the data match calculations and the reference deviation angle was then added to the reference deviation angle calculated from the modified Carter's Rule for the Phase I blade. Phase I Rotor deviation angles are shown on Figure 23. A plot of departure angles for each streamsurface section is shown in Figure 24. Once the intra-blade work distribution was chosen these departure angles were required to satisfy the desired incidence angles, deviation angles, and passage area ratios. The resulting streamsurface tip section of the Phase I rotor is compared to that of the baseline rotor in Figure 25. The "deviation angle minus reference deviation angle" for the Phase I rotor was kept essentially the same as the data match analysis although there are some small differences. Figure 26 shows the "delta deviation" compared to the data match of the baseline design.

If the performance of a new rotor design is to be accurately evaluated by comparing overall stage performance with the baseline design then it is important that the stator have nearly the same entering conditions in both cases. Figure 27 shows a comparison of the Phase I stator incidence angles with the data match base. As can be seen the differences are small.

Figure 28 shows the radial distribution of Phase I rotor throat margin and compares it to the data match case. The throat margin for a streamsurface blade section is defined here as the percent of excess throat area over and above the minimum theoretical area required to pass the streamtube flow at a throat Mach number of 1.0 and assuming a total pressure loss equivalent to a normal shock at the upstream Mach number. In a rotor the effect of radius change (between the leading edge and throat) on the relative total enthalpy and pressure is included. As can be seen in Figure 27 the Phase I rotor throat margin is nearly identical to that of the data match of the baseline design.

Details of the Phase I rotor design are given in Section VIII.

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   STAGE 1.   ROTOR   MU 0.   NB 20   ETA 0.

SECTION NO 8   SECTION HH   RHO 5.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0.07097	-0.67386	0.20644	-0.53565	0.40726
16	0.07441	-0.58250	0.13796	-0.44236	0.35169
17	0.07728	-0.49039	0.07316	-0.34981	0.29831
18	0.07956	-0.39748	0.01201	-0.25807	0.24705
19	0.08123	-0.30381	-0.04541	-0.16710	0.19782
20	0.08228	-0.20943	-0.09905	-0.07682	0.15051
21	0.08267	-0.11441	-0.14886	0.01281	0.10501
22	0.08243	-0.01886	-0.19486	0.10191	0.06122
23	0.08160	0.07713	-0.23717	0.19057	0.01912
24	0.08021	0.17353	-0.27585	0.27881	-0.02125
25	0.07830	0.27028	-0.31090	0.36672	-0.05985
26	0.07589	0.36731	-0.34231	0.45433	-0.09661
27	0.07299	0.46459	-0.37003	0.54171	-0.13147
28	0.06963	0.56210	-0.39393	0.62884	-0.16427
29	0.06579	0.65976	-0.41382	0.71583	-0.19489
30	0.06148	0.75749	-0.42946	0.80276	-0.22319
31	0.05666	0.85523	-0.44056	0.88967	-0.24902
32	0.05129	0.95302	-0.44665	0.97652	-0.27205
33	0.04533	1.05060	-0.44705	1.06360	-0.29189
34	0.03874	1.14761	-0.44114	1.15124	-0.30814
35	0.03146	1.24376	-0.42827	1.23974	-0.32029
36	0.02339	1.33869	-0.40723	1.32946	-0.32742
37	0.01601	1.41620	-0.38256	1.40582	-0.32854
38	0.00828	1.47861	-0.35719	1.47024	-0.32511
39	0.00828	1.48587	-0.35093	1.48125	-0.32800
40	0.00828	1.48795	-0.33746	1.48795	-0.33746

LE RAD 0.01046   CENTER AT ALPHA -1.58225   UPSILON 1.18054
TE RAD 0.01681   CENTER AT ALPHA   1.47172   UPSILON -0.34185

PHASE I ROTOR

STAGE 1. ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   NB 20   ETA 0.

SECTION NO 8   SECTION HH   RHO 5.0000

CHORD
3.4348

STAGGER
26.367

CAMBER
61.426

AREA 0.683730   SURFACE ARC LENGTH 7.19492

	ALPHA	UPSILON
SECTION C.G.	-0.09180	0.08751
STREAMSURFACE SECTION C.G.	-0.10275	0.06193
BLADE AXIS	-0.10275	0.06193
STACKING AXIS (RADIAL)	-0.00100	0.

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   STAGE 1. ROTOR   NB 20   ETA 0.

SECTION NO 9   SECTION JJ   MU 0.   RHO 4.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.55874	44.291	0.02101	1.04123
2	-1.47960	44.252	0.04331	0.96411
3	-1.32134	43.835	0.08725	0.81106
4	-1.16353	42.353	0.12920	0.66334
5	-1.00645	39.762	0.16789	0.52665
6	-0.83440	36.646	0.20551	0.39176
7	-0.64767	33.471	0.23992	0.26113
8	-0.46211	30.237	0.26710	0.14599
9	-0.27781	26.997	0.28662	0.04557
10	-0.09480	23.898	0.29813	-0.04132
11	0.08643	20.749	0.30147	-0.11582
12	0.26566	17.347	0.29698	-0.17798
13	0.44220	13.5C5	0.28524	-0.22728
14	0.61558	9.224	0.26657	-0.26283
15	0.78471	3.838	0.24106	-0.28282
16	0.94876	-3.246	0.20835	-0.28434
17	1.10632	-13.155	0.16738	-0.26285
18	1.25653	-26.601	0.11826	-0.20958
19	1.37531	-39.014	0.07522	-0.13149

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.00665	-1.55874	1.04123	44.291
2	0.0250	0.01319	-1.46559	0.96975	44.226
3	0.0500	0.01969	-1.41204	0.89848	44.105
4	0.0750	0.02611	-1.33869	0.82769	43.831
5	0.1000	0.03241	-1.26534	0.75779	43.366
6	0.1250	0.03856	-1.19199	0.68935	42.614
7	0.1500	0.04450	-1.11864	0.62303	41.584
8	0.1750	0.05022	-1.04528	0.55927	40.379
9	0.2000	0.05566	-0.97193	0.49836	39.020
10	0.2300	0.06179	-0.88391	0.42905	37.418
11	0.2600	0.06746	-0.79589	0.36355	35.896
12	0.2900	0.07266	-0.70787	0.30157	34.401
13	0.3200	0.07737	-0.61985	0.24295	32.924
14	0.3500	0.08157	-0.53183	0.18757	31.420
15	0.3800	0.08526	-0.44380	0.13540	29.876
16	0.4100	0.08840	-0.35578	0.08641	28.324
17	0.4400	0.09098	-0.26776	0.04048	26.782

COORD SYSTEM ORIGIN Z -7.03620 R 0. STAGE 1. ROTOR NB 20 ETA 0.

SECTION NO 9 SECTION JJ MU 0. RHO 4.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.09298	-0.17974	-0.00250	25.272
19	0.5000	0.09439	-0.09172	-0.04268	23.812
20	0.5300	0.09520	-0.00370	-0.08020	22.342
21	0.5600	0.09541	0.08433	-0.11502	20.810
22	0.5900	0.09503	0.17235	-0.14708	19.206
23	0.6200	0.09407	0.26037	-0.17631	17.521
24	0.6500	0.09253	0.34839	-0.20262	15.735
25	0.6800	0.09043	0.43641	-0.22586	13.819
26	0.7100	0.08776	0.52443	-0.24585	11.731
27	0.7400	0.08449	0.61245	-0.26231	9.415
28	0.7700	0.08061	0.70048	-0.27490	6.789
29	0.8000	0.07608	0.78850	-0.28308	3.760
30	0.8300	0.07084	0.87652	-0.28620	0.193
31	0.8600	0.06479	0.96454	-0.28335	-4.016
32	0.8900	0.05779	1.05256	-0.27330	-9.187
33	0.9200	0.04968	1.14058	-0.25421	-15.507
34	0.9500	0.04051	1.22860	-0.22288	-23.946
35	0.9750	0.03229	1.30196	-0.10393	-31.848
36	1.0000	0.02381	1.37531	-0.13149	-39.014

CHORD	STAGGER	CAMBER
3.1597	21.786	83.305

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPSILON	LOWER ALPHA	UPSILON
1	0.00665	-1.55874	1.04123	-1.55874	1.04123
2	0.00665	-1.56204	1.03284	-1.55047	1.04474
3	0.00665	-1.55933	1.02565	-1.54319	1.04221
4	0.01319	-1.49993	0.95482	-1.47086	0.98469
5	0.01969	-1.43369	0.87614	-1.39039	0.92082
6	0.02611	-1.36726	0.79793	-1.31012	0.85745
7	0.03241	-1.30050	0.72056	-1.23018	0.79502
8	0.03856	-1.23323	0.64452	-1.15074	0.73418
9	0.04450	-1.16530	0.57044	-1.07197	0.67562
10	0.05022	-1.09668	0.49883	-0.99389	0.61971
11	0.05566	-1.02730	0.43004	-0.91657	0.56667
12	0.06179	-0.94323	0.35152	-0.82459	0.50658
13	0.06746	-0.85838	0.27721	-0.73340	0.44989
14	0.07266	-0.77272	0.20686	-0.64301	0.39629

ZPC

STAGE 1. ROTOR   NB 20

COORD SYSTEM ORIGIN Z -7.03820 R 0.   MU 0.   ETA 0.

SECTION NO 9   SECTION JJ   RHO 4.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPSILON	LOWER ALPHA	UPSILON
15	0.07737	-0.68628	0.14035	-0.55341	0.34555
16	0.08157	-0.59901	0.07759	-0.46464	0.29744
17	0.08526	-0.51090	0.01861	-0.37671	0.25219
18	0.08840	-0.42204	-0.03653	-0.28952	0.20934
19	0.09098	-0.33253	-0.08783	-0.20300	0.16879
20	0.09298	-0.24245	-0.13534	-0.11703	0.13034
21	0.09439	-0.15193	-0.17912	-0.03151	0.09375
22	0.09520	-0.06087	-0.21932	0.05348	0.05892
23	0.09541	0.03077	-0.25593	0.13788	0.02589
24	0.09503	0.12296	-0.28886	0.22173	-0.00530
25	0.09407	0.21563	-0.31803	0.30511	-0.03460
26	0.09253	0.30875	-0.34333	0.38803	-0.06191
27	0.09043	0.40229	-0.36459	0.47054	-0.08713
28	0.08776	0.49624	-0.38160	0.55262	-0.11010
29	0.08449	0.59062	-0.39400	0.63429	-0.13063
30	0.08061	0.68542	-0.40136	0.71553	-0.14843
31	0.07608	0.78061	-0.40302	0.79638	-0.16314
32	0.07084	0.87614	-0.39812	0.87690	-0.17428
33	0.06479	0.97171	-0.38545	0.95737	-0.18124
34	0.05779	1.06714	-0.36342	1.03799	-0.18317
35	0.04968	1.16157	-0.32984	1.11960	-0.17856
36	0.04051	1.25458	-0.28137	1.20263	-0.16439
37	0.03229	1.32888	-0.22727	1.27504	-0.14059
38	0.02381	1.37114	-0.18916	1.32086	-0.11938
39	0.02381	1.38309	-0.16825	1.35102	-0.11573
40	0.02381	1.37531	-0.13149	1.37531	-0.13149

LE RAD 0.01162   CENTER AT ALPHA -1.55042   UPSILON 1.03312

TE RAD 0.04347   CENTER AT ALPHA 1.34084   UPSILON -0.15799

PHASE I ROTOR

                    STAGE   1.   ROTOR   NB   20

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   ETA 0.

    SECTION NO 9   SECTION JJ   RHO 4.5000

        CHORD   STAGGER   CAMBER
        3.1597   21.786   83.305

    AREA 0.701158   SURFACE ARC LENGTH 6.83135

                              ALPHA   UPSILON
    SECTION C.G.   -0.05003   0.03982
    STREAMSURFACE SECTION C.G. -0.05164   0.00502
    BLADE AXIS   -0.05164   0.00502
    STACKING AXIS (RADIAL)   -0.00100   0.

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PHASE I ROTOR

STAGE 1. ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.　MU 0.　NB 20　ETA 0.

SECTION NO 10　　SECTION KK　　RHO 4.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.52169	43.416	0.02343	0.90475
2	-1.44326	43.326	0.04621	0.83112
3	-1.28727	42.601	0.09087	0.68633
4	-1.13285	40.714	0.13328	0.54878
5	-0.97992	37.819	0.17236	0.42332
6	-0.81328	34.292	0.21056	0.30147
7	-0.63331	30.428	0.24603	0.18671
8	-0.45515	26.778	0.27484	0.08904
9	-0.27902	23.455	0.29671	0.00595
10	-0.10487	20.173	0.3 /49	-0.06415
11	0.06677	16.845	0.3;397	-0.12155
12	0.23554	13.463	0.31904	-0.16688
13	0.40051	9.867	0.31221	-0.20039
14	0.56094	5.454	0.29912	-0.22166
15	0.71584	-1.081	0.28004	-0.22774
16	0.86403	-11.287	0.25327	-0.21197
17	1.00455	-26.109	0.21515	-0.16271
18	1.13702	-42.458	0.16 2	-0.06513
19	1.24094	-54.030	0 .3008	0.06524

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.0000	0.00811	-1.52169	0.90475	43.416
2	0.0250	0.01506	-1.45263	0.83988	43.081
3	0.0500	0.02197	-1.38356	0.77537	42.976
4	0.0750	0.02881	-1.31449	0.71134	42.659
5	0.1000	0.0355	-1.24543	0.64825	42.115
6	0.1250	0.04211	-1.17636	0.58663	41.323
7	0.1500	0.04850	-1.10730	0.52697	40.273
8	0.175C	0.05468	-1.03823	C.46968	39.052
9	0.2000	0.06060	-0.96916	0.41498	37.677
10	0.2300	0.06734	-0.88629	0.35294	35.948
11	0.2600	0.07365	-0.80341	0.29473	34.211
12	0.2900	0.07952	-0.72053	0.24021	32.456
13	0.3200	0.08494	-0.63765	0.18928	30.676
14	0.3500	0.08988	-0.55477	0.14183	28.920
15	0.3800	0.09434	-0.47189	0.09761	27.253
16	0.4100	0.09830	-0.38901	0.05636	25.661
17	0.4400	0.10175	-0.30613	0.01793	24.093

STAGE 1. ROTOR   NB 20   ETA 0.

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.

SECTION NO 10   SECTION KK   RHO 4.0000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.10466	-0.22325	-0.01779	22.532
19	0.5000	0.10703	-0.14037	-3.05082	20.919
20	0.5300	0.10885	-0.05749	-0.08114	19.260
21	0.5600	0.11008	0.02538	-0.10876	17.592
22	0.5900	0.11071	0.10826	-0.13371	15.919
23	0.6200	0.11073	0.19114	-0.15603	14.207
24	0.6500	0.11015	0.27402	-0.17567	12.449
25	0.6800	0.10898	0.35690	-0.19260	10.624
26	0.7100	0.10722	0.43978	-0.20673	8.692
27	0.7400	0.10488	0.52266	-0.21776	6.402
28	0.7700	0.10194	0.60554	-0.22513	3.651
29	0.8000	0.09834	0.68842	-0.22798	0.157
30	0.8300	0.09395	0.77130	-0.22510	-4.444
31	0.8600	0.08846	0.85418	-0.21400	-11.141
32	0.8900	0.08148	0.93705	-0.19144	-19.423
33	0.9200	0.07275	1.01993	-0.15469	-28.432
34	0.9500	0.06250	1.10281	-0.09775	-40.803
35	0.9750	0.05370	1.17188	-0.02534	-50.686
36	1.0000	0.04505	1.24094	0.06524	-53.608

CHORD 2.8874   STAGGER 16.903   CAMBER 97.025

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
1	0.00811	-1.52169	0.90475	-1.52169	0.90475
2	0.00811	-1.52522	0.89530	-1.51254	0.90684
3	0.00811	-1.52208	0.88734	-1.50435	0.90619
4	0.01506	-1.46748	0.82399	-1.43777	0.85576
5	0.02197	-1.40519	0.75216	-1.36194	0.79658
6	0.02881	-1.34268	0.68075	-1.28631	0.74192
7	0.03553	-1.27983	0.61020	-1.21103	0.68630
8	0.04211	-1.21650	0.54098	-1.13622	0.63228
9	0.04850	-1.15256	0.47355	-1.06203	0.58040
10	0.05468	-1.08796	0.40838	-0.98850	0.53098
11	0.06060	-1.02264	0.34574	-0.91569	0.48422
12	0.06734	-0.94336	0.27424	-0.82922	0.43164
13	0.07365	-0.86319	0.20680	-0.74362	0.38256
14	0.07952	-0.78214	0.14333	-0.65892	0.33708

ZPC

COORD SYSTEM ORIGIN Z -7.03620 R 0.   STAGE 1. ROTOR   MU 0.   NB 20   ETA 0.

SECTION NO 10   SECTION KK   RHO 4.0000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0.08494	-0.70021	0.08381	-0.57509	0.29474
16	0.08988	-0.61752	0.02824	-0.49202	0.25541
17	0.09434	-0.53426	-0.02348	-0.40952	0.21869
18	0.09830	-0.45047	-0.07156	-0.32755	0.18429
19	0.10175	-0.36610	-0.11617	-0.24617	0.15203
20	0.10466	-0.28115	-0.15736	-0.16535	0.12178
21	0.10703	-0.19555	-0.19516	-0.08520	0.09382
22	0.10885	-0.10933	-0.22949	-0.00566	0.06720
23	0.11008	-0.02265	-0.26024	0.07342	0.04273
24	0.11071	0.06443	-0.28741	0.15210	0.01999
25	0.11073	0.15191	-0.31100	0.23038	-0.00106
26	0.11015	0.23974	-0.33096	0.30830	-0.02038
27	0.10898	0.32789	-0.34724	0.38591	-0.03796
28	0.10722	0.41639	-0.35975	0.46317	-0.05371
29	0.10488	0.50577	-0.36823	0.53954	-0.06729
30	0.10194	0.59617	-0.37200	0.61491	-0.07826
31	0.09834	0.68803	-0.36995	0.68881	-0.08600
32	0.09395	0.78181	-0.36033	0.76079	-0.08987
33	0.08846	0.87885	-0.33930	0.82950	-0.08869
34	0.08148	0.97617	-0.30238	0.89793	-0.08049
35	0.07275	1.06994	-0.24706	0.96992	-0.06233
36	0.06250	1.16178	-0.16606	1.04385	-0.02945
37	0.05370	1.23186	-0.07446	1.11189	0.02378
38	0.04505	1.25956	-0.03085	1.14787	0.06008
39	0.04505	1.27011	0.01014	1.19394	0.07957
40	0.04505	1.24094	0.06524	1.24094	0.06524

LE RAD 0.01302   CENTER AT ALPHA -1.51222   UPSILON   UPSILON 0.89583
TE RAD 0.07268   CENTER AT ALPHA   1.19749   UPSILON   UPSILON 0.00698

PHASE I ROTOR

STAGE   1.   ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   NB 20   ETA 0.

SECTION NO 10   SECTION KK   RHO 4.0000

CHORD   STAGGER   CAMBER
2.8874   16.903   97.025

AREA   0.715799   SURFACE ARC LENGTH   6.51846

	ALPHA	UPSILON
SECTION C.G.	-0.02010	0.01652
STREAMSURFACE SECTION C.G.	-0.02079	-0.01332
BLADE AXIS	-0.02079	-0.02332
STACKING AXIS (RADIAL)	-0.00100	0.

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PHASE I ROTOR

STAGE 1. ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0. MU 0. NB 20 ETA 0.

SECTION NO 11 SECTION LL RHO 3.5000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.49725	42.258	0.02960	0.78361
2	-1.42138	41.611	0.05246	0.71483
3	-1.27072	39.723	0.09669	0.58389
4	-1.12171	37.137	0.13833	0.46453
5	-0.97404	34.213	0.17664	0.35825
6	-0.81325	30.866	0.21432	0.25591
7	-0.63981	27.216	0.24984	0.16033
8	-0.46835	23.930	0.27929	0.07934
9	-0.29920	20.844	0.30270	0.01075
10	-0.13256	17.770	0.32016	-0.04650
11	0.03091	14.720	0.33163	-0.09329
12	0.19071	11.515	0.33711	-0.13021
13	0.34610	8.051	0.33664	-0.15725
14	0.49611	3.267	0.33084	-0.17286
15	0.63997	-4.969	0.31947	-0.17123
16	0.77519	-18.623	0.29889	-0.14057
17	0.90105	-36.764	0.26328	-0.06332
18	1.01711	-53.056	0.21748	0.07915
19	1.10656	-62.799	0.18494	0.26197

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.0250	0.01115	-1.49725	0.78361	42.258
2	0.0500	0.01854	-1.43216	0.72453	42.053
3	0.0750	0.02584	-1.36706	0.66657	41.285
4	0.1000	0.03301	-1.30197	0.61027	40.407
5	0.1250	0.04005	-1.23687	0.55580	39.417
6	0.1500	0.04693	-1.17178	0.50335	38.274
7	0.1750	0.05361	-1.10668	0.45315	36.966
8	0.2000	0.06007	-1.04159	0.40536	35.601
9	0.2300	0.06629	-0.97649	0.35992	34.232
10	0.2600	0.07340	-0.89838	0.30840	32.572
11	0.2900	0.08012	-0.82026	0.26009	30.879
12	0.3200	0.08644	-0.74215	0.21494	29.178
13	0.3500	0.09234	-0.66403	0.17281	27.510
14	0.3800	0.09780	-0.58592	0.13352	25.893
15	0.4100	0.10281	-0.50780	0.09690	24.363
16	0.4400	0.10737	-0.42969	0.06271	22.917
17		0.11149	-0.35157	0.03084	21.471

COORD SYSTEM ORIGIN Z -7.03620 R 0.　STAGE 1. ROTOR　MU 0.　NB 20　ETA 0.

SECTION NO 11　　　SECTION LL　　　RHO 3.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.11514	-0.27346	0.00125	20.012
19	0.5000	0.11834	-0.19535	-0.02609	18.573
20	0.5300	0.12106	-0.11723	-0.05127	17.166
21	0.5600	0.12330	-0.03912	-0.07436	15.763
22	0.5900	0.12504	0.03900	-0.09537	14.347
23	0.6200	0.12627	0.11711	-0.11431	12.896
24	0.6500	0.12697	0.19523	-0.13113	11.394
25	0.6800	0.12712	0.27334	-0.14575	9.765
26	0.7100	0.12672	0.35146	-0.15801	8.025
27	0.7400	0.12580	0.42957	-0.16755	5.776
28	0.7700	0.12433	0.50769	-0.17347	2.760
29	0.8000	0.12225	0.58580	-0.17448	-1.545
30	0.8300	0.11928	0.66391	-0.16852	-7.519
31	0.8600	0.11497	0.74203	-0.15210	-16.768
32	0.8900	0.10857	0.82014	-0.11952	-28.523
33	0.9200	0.09952	0.89826	-0.06569	-40.174
34	0.9500	0.08803	0.97637	0.01718	-53.141
35	0.9750	0.07842	1.04147	0.12404	-62.847
36	1.0000	0.06964	1.10656	0.26197	-65.591

CHORD 2.6556　　STAGGER 11.328　　CAMBER 107.849

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
1	0.01115	-1.49725	0.78361	-1.49725	0.78361
2	0.01115	-1.50155	0.77149	-1.48583	0.78898
3	0.01115	-1.49747	0.76154	-1.47531	0.78585
4	0.01854	-1.44865	0.70626	-1.41567	0.74281
5	0.02584	-1.38970	0.64079	-1.34443	0.69235
6	0.03301	-1.33038	0.57690	-1.27355	0.64365
7	0.04005	-1.27064	0.51471	-1.20311	0.59688
8	0.04693	-1.21038	0.45443	-1.13318	0.55227
9	0.05361	-1.14949	0.39627	-1.06387	0.51003
10	0.06007	-1.08802	0.34051	-0.99515	0.47072
11	0.06629	-1.02600	0.28715	-0.92698	0.43268
12	0.07340	-0.95084	0.22627	-0.84591	0.39053
13	0.08012	-0.87486	0.16879	-0.76566	0.35140
14	0.08644	-0.79810	0.11473	-0.68619	0.31516

PHASE I ROTOR

STAGE 1. ROTOR   NB 20

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   ETA 0.

SECTION NO 11   SECTION LL   RHO 3.5000

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0.09234	-0.72067	0.06406	-0.60740	0.28155
16	0.09780	-0.64262	0.01670	-0.52921	0.25035
17	0.10281	-0.56412	-0.02746	-0.45149	0.22125
18	0.10737	-0.48520	-0.06861	-0.37417	0.19402
19	0.11149	-0.40576	-0.10692	-0.29739	0.16859
20	0.11514	-0.32578	-0.14240	-0.22114	0.14491
21	0.11834	-0.24539	-0.17503	-0.14530	0.12286
22	0.12106	-0.16467	-0.20485	-0.06979	0.10231
23	0.12330	-0.08359	-0.23191	0.00536	0.08319
24	0.12504	-0.00214	-0.25622	0.08014	0.06547
25	0.12627	0.07969	-0.27774	0.15453	0.04912
26	0.12697	0.16192	-0.29639	0.22853	0.03414
27	0.12712	0.24463	-0.31208	0.30203	0.02058
28	0.12672	0.32797	-0.32462	0.37495	0.00860
29	0.12580	0.41276	-0.33374	0.44638	-0.00137
30	0.12433	0.49974	-0.33837	0.51563	-0.00858
31	0.12225	0.59018	-0.33674	0.58142	-0.01223
32	0.11928	0.68464	-0.32554	0.64319	-0.01151
33	0.11497	0.78607	-0.29826	0.69799	-0.00593
34	0.10857	0.88898	-0.24618	0.75131	0.00714
35	0.09952	0.98350	-0.16665	0.81301	0.03528
36	0.08803	1.06989	-0.05294	0.88285	0.08729
37	0.07842	1.13412	0.07652	0.94882	0.17156
38	0.06964	1.15761	0.13507	0.98277	0.23001
39	0.06964	1.16125	0.19572	1.03872	0.26821
40	0.06964	1.10656	0.26197	1.10656	0.26197

LE RAD 0.01655   CENTER AT ALPHA -1.48503   UPSILON 0.77246
TE RAD 0.10032   CENTER AT ALPHA   1.06399   UPSILON 0.17113

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ZPC

STAGE   1.   ROTOR   NB   20

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   ETA 0.

SECTION NO 11   SECTION LL   RHO   3.5000

CHORD   STAGGER   CAMBER
2.6556   11.328   107.849

AREA   0.738220   SURFACE ARC LENGTH   6.29382

	ALPHA	UPSILON
SECTION C.G.	0.00461	0.02958
STREAMSURFACE SECTION C.G.	-0.00090	-0.01162
BLADE AXIS	-0.00090	-0.01162
STACKING AXIS (RADIAL)	-0.00100	0.

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   NB 20   ETA 0.

SECTION NO 12   SECTION MM   RHO 3.0000

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.48244	39.275	0.04056	0.68883
2	-1.40860	38.105	0.06247	0.63019
3	-1.26224	35.640	0.10462	0.52190
4	-1.11770	33.206	0.14413	0.42459
5	-0.97477	30.902	0.18046	0.33671
6	-0.81929	28.281	0.21659	0.24974
7	-0.65177	25.185	0.25138	0.16622
8	-0.48646	21.993	0.28125	0.09434
9	-0.32358	18.779	0.30646	0.03370
10	-0.16359	15.848	0.32714	-0.01675
11	-0.00730	12.985	0.34321	-0.05839
12	0.14447	9.789	0.35469	-0.09064
13	0.29106	6.327	0.36092	-0.11323
14	0.43113	1.096	0.36255	-0.12396
15	0.56410	-8.812	0.35890	-0.11472
16	0.68634	-25.379	0.34451	-0.06917
17	0.79754	-45.119	0.31140	0.03608
18	0.89721	-60.177	0.26714	0.22343
19	0.97218	-68.304	0.23980	0.45870

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.	0.01645	-1.48244	0.68883	39.275
2	0.0250	0.02384	-1.42107	0.63988	37.951
3	0.0500	0.03114	-1.35971	0.59290	36.918
4	0.0750	0.03829	-1.29834	0.54767	35.854
5	0.1000	0.04531	-1.23698	0.50422	34.753
6	0.1250	0.05216	-1.17561	0.46249	33.684
7	0.1500	0.05863	-1.11425	0.42237	32.667
8	0.1750	0.06529	-1.05288	0.38377	31.683
9	0.2000	0.07153	-0.99152	0.34661	30.717
10	0.2300	0.07873	-0.91788	0.30384	29.562
11	0.2600	0.08560	-0.84424	0.26308	28.359
12	0.2900	0.09214	-0.77060	0.22436	27.108
13	0.3200	0.09834	-0.69696	0.18770	25.820
14	0.3500	0.10418	-0.62332	0.15310	24.496
15	0.3800	0.10966	-0.54968	0.12059	23.141
16	0.4100	0.11478	-0.47604	0.09016	21.755
17	0.4400	0.11957	-0.40241	0.06181	20.365

PHASE I ROTOR

STAGE 1. ROTOR NB 20 ETA 0.

COORD SYSTEM ORIGIN Z -7.03620 R 0. MU 0. RHO 3.0000

SECTION NO 12 SECTION MM

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/S	ALPHA	UPSILON	ZETA*
18	0.4700	0.12401	-0.32877	0.03547	18.987
19	0.5000	0.12870	-0.25513	0.01109	17.669
20	0.5300	0.13184	-0.18149	-0.01151	16.473
21	0.5600	0.13521	-0.10785	-0.03250	15.325
22	0.5900	0.13821	-0.03421	-0.05180	14.025
23	0.6200	0.14084	0.03943	-0.06923	12.587
24	0.6500	0.14306	0.11307	-0.08467	11.092
25	0.6800	0.14480	0.18670	-0.09808	9.520
26	0.7100	0.14602	0.26034	-0.10928	7.740
27	0.7400	0.14678	0.33398	-0.11796	5.584
28	0.7700	0.14707	0.40762	-0.12322	2.399
29	0.8000	0.14684	0.48126	-0.12356	-2.246
30	0.8300	0.14579	0.55490	-0.11633	-9.363
31	0.8600	0.14336	0.62854	-0.09744	-20.278
32	0.8900	0.13839	0.70217	-0.05867	-35.195
33	0.9200	0.12969	0.77581	0.00926	-49.181
34	0.9500	0.11698	0.84945	0.11692	-61.702
35	0.9750	0.10614	0.91082	0.26120	-70.923
36	1.0000	0.09727	0.97218	0.45870	-73.527

CHORD 2.4654

STAGGER 5.356

CAMBER 112.801

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPSILON	LOWER ALPHA	UPSILON
1	0.01645	-1.48244	0.68883	-1.48244	0.68883
2	0.01645	-1.48727	0.67169	-1.46525	0.69749
3	0.01645	-1.48083	0.65838	-1.44883	0.69137
4	0.02384	-1.43915	0.61670	-1.40300	0.66306
5	0.03114	-1.38276	0.56222	-1.33665	0.62359
6	0.03829	-1.32599	0.50941	-1.27069	0.58593
7	0.04531	-1.26881	0.45833	-1.20514	0.55010
8	0.05216	-1.21127	0.40898	-1.13995	0.51599
9	0.05883	-1.15339	0.36132	-1.07510	0.48342
10	0.06529	-1.09515	0.31528	-1.01061	0.45226
11	0.07153	-1.03656	0.27080	-0.94647	0.42241
12	0.07873	-0.96576	0.21943	-0.87000	0.38626
13	0.08560	-0.89436	0.17023	-0.79412	0.35594
14	0.09214	-0.82235	0.12326	-0.71884	0.32546

PHASE I ROTOR

STAGE 1. ROTOR NB 20

COORD SYSTEM ORIGIN Z -7.03620 R 0. MU 0. RHO 3.0000 ETA 0.

SECTION NO 12 SECTION MM

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0.09834	-0.74976	0.07858	-0.64416	0.29681
16	0.10418	-0.67657	0.03624	-0.57007	0.26996
17	0.10966	-0.60280	-0.00370	-0.49656	0.24489
18	0.11478	-0.52849	-0.04125	-0.42360	0.22158
19	0.11957	-0.45370	-0.07637	-0.35111	0.19998
20	0.12401	-0.37850	-0.10907	-0.27903	0.18002
21	0.12810	-0.30306	-0.13937	-0.20720	0.16185
22	0.13184	-0.22757	-0.16735	-0.13541	0.14434
23	0.13521	-0.15190	-0.19324	-0.06380	0.12825
24	0.13821	-0.07550	-0.21709	0.00708	0.11349
25	0.14084	0.00159	-0.23867	0.07726	0.10022
26	0.14306	0.07914	-0.25773	0.14699	0.08639
27	0.14480	0.15718	-0.27411	0.21623	0.07796
28	0.14602	0.23610	-0.28764	0.28458	0.06909
29	0.14678	0.31637	-0.29804	0.35159	0.06211
30	0.14707	0.40003	-0.30436	0.41521	0.05791
31	0.14684	0.48836	-0.30443	0.47416	0.05730
32	0.14579	0.58413	-0.29364	0.52566	0.06099
33	0.14336	0.68978	-0.26321	0.56729	0.06832
34	0.13839	0.80049	-0.19807	0.60385	0.08074
35	0.12969	0.89680	-0.09525	0.65483	0.11376
36	0.11698	0.97642	0.04856	0.72248	0.16527
37	0.10614	1.03447	0.21844	0.78716	0.30396
38	0.09727	1.05754	0.30632	0.82169	0.39679
39	0.09727	1.05187	0.38552	0.88453	0.45444
40	0.09727	0.97218	0.45870	0.97218	0.45870

LE RAD 0.02299 CENTER AT ALPHA -1.46445 UPSILON 0.67451
TE RAD 0.12722 CENTER AT ALPHA 0.93415 UPSILON 0.33729

PHASE I ROTOR

STAGE   1.   ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   NB 20

SECTION NO 12   SECTION MM   RHO   3.0000   ETA   0.

CHORD   STAGGER   CAMBER
2.4654   5.356   112.801

AREA   0.774435   SURFACE ARC LENGTH   6.15902

	ALPHA	UPSILON
SECTION C.G.	0.02446	0.07034
STREAMSURFACE SECTION C.G.	0.01723	0.00830
BLADE AXIS	0.01723	0.00830
STACKING AXIS (RADIAL)	-0.00100	0.

STAGE 1.   ROTOR   NB 20   ETA 0.

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   RHO 2.5000

SECTION NO 13   SECTION NN

MEANLINE INPUT DATA

PT	ALPHA	ZETA*	THICKNESS	UPSILON
1	-1.46853	34.199	0.05414	0.61509
2	-1.39686	33.044	0.07433	0.56814
3	-1.25499	30.913	0.11342	0.48095
4	-1.11491	29.132	0.15016	0.40103
5	-0.97662	27.629	0.18416	0.32662
6	-0.82619	25.806	0.21858	0.25060
7	-0.66428	23.253	0.25267	0.17575
8	-0.50488	20.071	0.28304	0.11093
9	-0.34809	16.682	0.31016	0.05716
10	-0.19464	13.894	0.33410	0.01307
11	-0.04551	11.226	0.35479	-0.02350
12	0.09824	8.045	0.37227	-0.05107
13	0.23602	4.591	0.38521	-0.06922
14	0.36615	-1.078	0.39426	-0.07505
15	0.48823	-12.577	0.39833	-0.05822
16	0.59750	-31.457	0.39013	0.00223
17	0.69404	-51.589	0.35952	0.13547
18	0.77730	-65.150	0.31680	0.36771
19	0.83780	-72.019	0.29466	0.65542

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
1	0.0250	0.02347	-1.46853	0.61509	33.448
2	0.0500	0.03052	-1.41087	0.57721	33.011
3	0.0500	0.03751	-1.35322	0.54048	31.981
4	0.0750	0.04439	-1.29556	0.50512	31.069
5	0.1000	0.05116	-1.23790	0.47092	30.311
6	0.1250	0.05778	-1.18024	0.43767	29.639
7	0.1500	0.06425	-1.12258	0.40527	29.030
8	0.1750	0.07054	-1.06492	0.37365	28.465
9	0.2000	0.07666	-1.00727	0.34275	27.904
10	0.2300	0.08377	-0.93808	0.30663	27.223
11	0.2600	0.09064	-0.86889	0.27161	26.457
12	0.2900	0.09727	-0.79970	0.23781	25.593
13	0.3200	0.10366	-0.73051	0.20537	24.617
14	0.3500	0.10979	-0.66132	0.17445	23.521
15	0.3800	0.11566	-0.59213	0.14520	22.296
16	0.4100	0.12128	-0.52294	0.11777	20.930
17	0.4400	0.12666	-0.45375	0.09231	19.474

PHASE I ROTOR

COORD SYSTEM ORIGIN Z -7.03620 R 0.

	STAGE	1.	ROTOR		NB	20
				MU 0.		ETA 0.

SECTION NO 13   SECTION NN   RHO 2.5000

MEANLINE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	PCT AL	T/C	ALPHA	UPSILON	ZETA*
18	0.4700	0.13183	-0.38456	0.06880	18.064
19	0.5000	0.13677	-0.31537	0.04714	16.729
20	0.5300	0.14149	-0.24618	0.02711	15.597
21	0.5600	0.14596	-0.17698	0.00840	14.680
22	0.5900	0.15019	-0.10779	0.00907	13.620
23	0.6200	0.15420	-0.03360	0.02501	12.268
24	0.6500	0.15800	0.03059	-0.03911	10.770
25	0.6800	0.16146	0.09978	-0.05132	9.230
26	0.7100	0.16447	0.16897	-0.06153	7.506
27	0.7400	0.16707	0.23816	-0.06942	5.459
28	0.7700	0.16932	0.30735	-0.07436	2.451
29	0.8000	0.17117	0.37654	-0.07474	-2.114
30	0.8300	0.17245	0.44573	-0.06793	-9.743
31	0.8600	0.17252	0.51492	-0.04923	-21.273
32	0.8900	0.17008	0.58411	-0.00924	-38.808
33	0.9200	0.15296	0.65330	0.06723	-55.269
34	0.9500	0.14958	0.72249	0.19634	-67.376
35	0.9750	0.13679	0.78014	0.37923	-76.311
36	1.0000	0.12774	0.83780	0.65542	-78.974

CHORD 2.3067   STAGGER -1.002   CAMBER 112.423

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER		LOWER	
		ALPHA	UPSILON	ALPHA	UPSILON
1	0.02347	-1.46853	0.61509	-1.46853	0.61509
2	0.02347	-1.47290	0.59182	-1.44948	0.62806
3	0.02347	-1.46275	0.57499	-1.42949	0.62549
4	0.03052	-1.43005	0.54769	-1.39170	0.60672
5	0.03751	-1.37613	0.50378	-1.33031	0.57717
6	0.04439	-1.32198	0.46127	-1.26913	0.54898
7	0.05116	-1.26768	0.41998	-1.20812	0.52186
8	0.05778	-1.21320	0.37975	-1.14728	0.49559
9	0.06425	-1.15854	0.34048	-1.08662	0.47007
10	0.07054	-1.10370	0.30212	-1.02615	0.44517
11	0.07666	-1.04664	0.26462	-0.96589	0.42088
12	0.08377	-0.98227	0.22072	-0.89388	0.39254
13	0.09064	-0.91546	0.17802	-0.82231	0.36519
14	0.09727	-0.84816	0.13663	-0.75123	0.33899

PHASE I ROTOR

STAGE 1. ROTOR   NB 20   ETA 0.

COORD SYSTEM ORIGIN Z -7.03620 R 0.   MU 0.   RHO 2.5000

SECTION NO 13   SECTION NN

SURFACE COORDINATES WITH ORIGIN AT SECTION AXIS

PT	T/C	UPPER ALPHA	UPPER UPSILON	LOWER ALPHA	LOWER UPSILON
15	0.10368	-0.78031	0.09668	-0.68071	0.31406
16	0.10979	-0.71185	0.05835	-0.61078	0.29056
17	0.11566	-0.64273	0.02177	-0.54152	0.26862
18	0.12128	-0.57290	-0.01288	-0.47297	0.24841
19	0.12666	-0.50245	-0.04542	-0.40504	0.23004
20	0.13183	-0.43170	-0.07575	-0.33741	0.21335
21	0.13677	-0.36077	-0.10393	-0.26996	0.19820
22	0.14149	-0.29005	-0.13007	-0.20230	0.18428
23	0.14596	-0.21965	-0.15444	-0.13432	0.17125
24	0.15019	-0.14859	-0.17742	-0.06700	0.15927
25	0.15420	-0.07640	-0.19879	-0.00081	0.14878
26	0.15800	-0.00347	-0.21813	0.06464	0.13991
27	0.16146	0.06991	-0.23512	0.12965	0.13249
28	0.16447	0.14419	-0.24959	0.19374	0.12653
29	0.16707	0.21982	-0.26124	0.25649	0.12239
30	0.16932	0.29899	-0.26946	0.31570	0.12074
31	0.17117	0.38382	-0.27203	0.36925	0.12265
32	0.17245	0.47938	-0.26395	0.41207	0.12809
33	0.17252	0.58711	-0.23465	0.44272	0.13619
34	0.17008	0.70704	-0.16210	0.46117	0.14361
35	0.16296	0.80776	-0.03985	0.49883	0.17431
36	0.14958	0.88172	0.12998	0.56325	0.26270
37	0.13679	0.93343	0.34190	0.62686	0.41657
38	0.12774	0.95702	0.48063	0.66313	0.56290
39	0.12774	0.94115	0.57721	0.73126	0.63974
40	0.12774	0.83780	0.65542	0.83780	0.65542

LE RAD	0.03045	CENTER AT ALPHA	-1.44315	UPSILON 0.59828
TE RAD	0.15355	CENTER AT ALPHA	0.80547	UPSILON 0.50532

ZPC

PHASE I ROTOR

STAGE 1. ROTOR   MU 0.   NB 20   ETA 0.

COORD SYSTEM ORIGIN Z -7.03620 R 0.

SECTION NO 13   SECTION NN   RHO 2.5000

CHORD   STAGGER   CAMBER
2.3067   -1.002   112.423

AREA 0.823718   SURFACE ARC LENGTH   6.09552

	ALPHA	UPSILON
SECTION C.G.	0.03808	0.12830
STREAMSURFACE SECTION C.G.	0.03536	0.02822
BLADE AXIS	0.03536	0.02822
STACKING AXIS (RADIAL)	-0.00100	0.

PHASE I ROTOR

STAGE 1. ROTOR   NB   20

SECT	NO	RHO	CHORD	STAGGER	CAMBER	TM/C	ZETA1*	ZETA2*
AA	1	8.50000	3.7610	58.59	1.08	0.02561	56.21	55.13
BB	2	8.00000	3.9107	55.60	3.31	0.02618	54.09	50.78
CC	3	7.50000	3.9279	51.58	5.50	0.03079	52.35	46.85
DD	4	7.00000	3.8194	46.26	11.76	0.04044	50.83	39.07
EE	5	6.50000	3.7298	41.29	19.63	0.05289	49.44	29.81
FF	6	6.00000	3.6588	36.51	28.46	0.06380	48.31	19.85
GG	7	5.50000	3.6019	31.47	41.50	0.07294	47.25	5.76
HH	8	5.00000	3.4348	26.37	61.43	0.08267	45.79	-15.64
JJ	9	4.50000	3.1597	21.79	83.31	0.09541	44.29	-39.01
KK	10	4.00000	2.8874	16.90	97.02	0.11073	43.42	-53.61
LL	11	3.50000	2.6556	11.33	107.85	0.12712	42.26	-65.59
MM	12	3.00000	2.4654	5.36	112.80	0.14707	39.27	-73.53
NN	13	2.50000	2.3067	-1.00	112.42	0.17252	33.45	-78.97